FOOD MANUFACTURE

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FOOD MANUFACTURE

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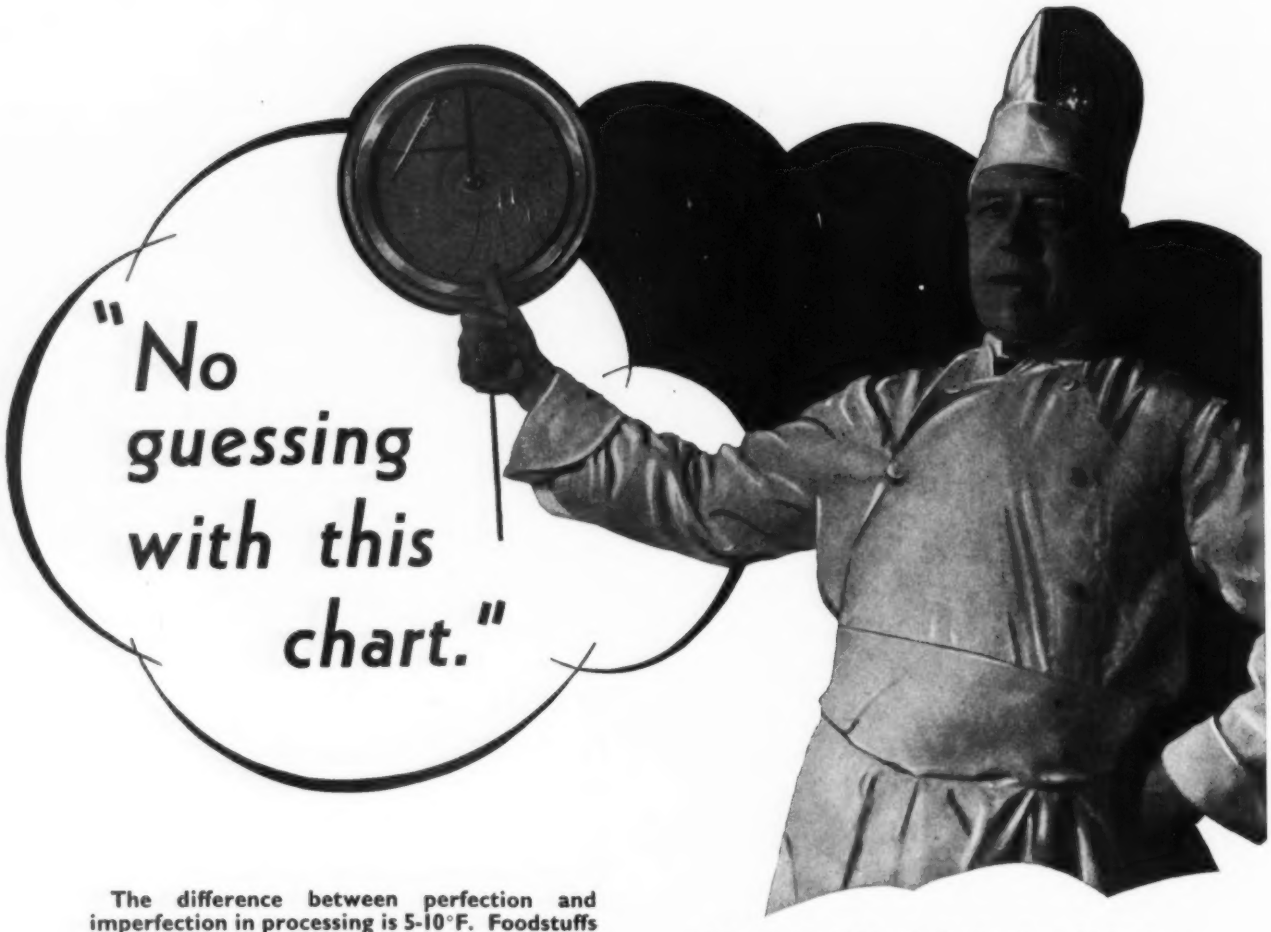

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FOOD MANUFACTURE

Vol. XII, No. 8 August, 1937

Chocolate and Confectionery Prices

IT IS axiomatic that all bodies tend to fall under their own weight, and in this category prices may well be included. Conversely, certain effort has to be expended to raise bodies and in this case it is particularly true of prices. The recent increases in raw material costs, labour, fuel, and incidental expenses in the confectionery industry are such that it is no longer possible in most cases to continue profitable production at the present retail price levels.

Neither improvement in manufacturing methods nor substitution of lower priced ingredients offer any solution to the problem, as both these items have already been investigated to the full, and the only hope, therefore, appears to lie in an increase of price in the case of goods sold by weight and either that or a reduction of size of articles sold by count.

Great objection is always voiced by the wholesale section of the trade to fractional prices, but the fears expressed are quite probably over-estimated. The allied food industry seems to thrive on such fare, and fractional weights and prices seem to be the rule rather than the exception.

The difficulties that arise in any attempt to raise prices are increased by the lack of co-operation in the industry, otherwise a general increase could be arranged simultaneously, as is done in certain other trades. The most thorny problem that remains is the question of existing stocks in the hands of wholesalers and retailers, and here again the matter of co-operation arises. It is doubtless possible to arrange the distribution and supply of a product so as to ensure that "corners" are not made of available quantities to the subsequent detriment of other traders, but unless there is an understanding between large producers it seems likely that unscrupulous elements would largely stultify the efforts of a single manufacturer.

Various remedies have been suggested such as rationalisation, nationalisation, or some other high-sounding term, and these may be of service to the chocolate industry, the original control of which is vested in a few influential hands. As regards the sugar side of the industry, the large number of backyard and home manufacturers present certain obstacles, but, given good will, it should be possible to evolve some scheme to effect the desired result to the benefit rather than the detriment of all concerned.

Crop Anticipations

The fluctuations in the price of wheat and the depressing reports of foreign crops make a forecast of home crops more interesting than usual. According to *The Times* Special Report on British Crops the prospects are not rosy, and it is now almost certain that 1937 will not be a good cereal year. In regard to wheat, it is curious to note the regional variations. On the heavy lands of Cambridgeshire the outlook is considered "appalling," whereas in the light lands in Hampshire the prospects are better now than they were this time last year. In Cambridgeshire the index figure for wheat this year is only 79 against 94·3 last year, whereas in Hampshire the figures are 84 this year against 75·5 last year. Taking the country all round the figure is about the same as last year and well below the ten years' average. Not only is wheat poor—all crops seem to have suffered from the very wet season. Barley is poor—in Norfolk the crops are very bad. Potatoes are doing well on the lighter soils, but plantings of the main crop were delayed by wet weather and the yield will be lower than last year. Sugar beet does not look as well as it should. Again the trouble has been the wet condition of the land at sowing time and the impossibility of getting a good tilth on the land. Too much rain damaged the early stages of the crop, and now such as survived is suffering from lack of rain. The only crop that seems to have done well has been grass. The old proverb, "A wet and windy May fills barns with corn and hay", has only proved half right this season, and it looks as if the corn and root crop yield will be well below average this year.

Flour Prices

The price of flour has shown a tendency to increase during the last six years. In 1932 standard grade flour was 23s. per sack—to-day it is round about 43s. While the price has been steadily on the upgrade the market has fluctuated uneasily in the last twelve months. In 1936 there were no fewer than 42 changes in the price of standard grade flour and in the first half of this year there have been 26 alterations. In June last year the price dropped as low as 26s., this year it touched 42s. These fluctuations have given rise to much apprehension and fears have openly been expressed in many quarters of an approaching famine in wheat. A variety of causes led to the increase in prices. The chief one was that owing to a couple of bad harvests the large accumulated surplus of wheat was used up, and this led to more active forward buying and subsequent stiffening of prices. The entry of Italy and Germany—usually self-supporting—into the group of buyers had a further hardening effect. The present day fluctuations are largely based on weather and crop reports, and have been magnified by the absence of any appreciable surplus. In a state of living from hand to mouth, reports of adverse weather, rust disease, or frost damage may cause the most violent fluctuations. It must be remembered that these fluctuations do not mean a famine or indeed a serious shortage. When demand equals supply prices must necessarily be firm, and when one sees the price of flour at 45s. a sack it is just as reasonable to remember that it was 82s. in 1920 as only to think of it at the 1930 price of 20s.

Russia's Bread Problems

Russia has always played a prominent part in the world's bread game. Before the Great War she was one of the most important suppliers of grain, and although, since the formation of the Soviet, her exports have been spasmodic her influence has none the less been felt in the grain market. On one occasion her sudden decision to unload vast supplies was enough to drive the world wheat market into chaos. Vast changes have taken place in the habits and ideals of the Russian people. Over thirty years ago Edgar, in his *Story of a Grain of Wheat*, stated that "Russia would be a formidable competitor in European markets if it were possible for her to overcome the inertia of an ignorant, improvident and conservative peasantry, which clings to methods of wheat growing which are but a slight advance over those in use during the Middle Ages". The events of the last decade have certainly brought about drastic alterations. The peasants have been liberated (theoretically, at any rate) and the antiquated ploughshare has been replaced by tractors and all the gadgets of modern mechanisation. An obvious question which comes to our minds is, "How have the so-called emancipation of the Russian peasantry and the modernisation of agricultural implements and technique, affected conditions in Russia?" That is, however, a difficult question to answer—authentic statistics and reliable information about conditions in Russia are notoriously conspicuous by their absence and are issued by a régime that does not believe in the doctrine of crying stinking fish. In these circumstances, therefore, a recent study from the Stanford University, California, entitled "Soviet Agricultural Reorganisation and the Bread Grain Situation" is of intense interest.

U.S.S.R. since 1930

The authors claim that "this study illuminates the course of agricultural development in the U.S.S.R. since 1930 when Soviet grain exports reached spectacular heights after a bumper crop". The main conclusion appears to be that socialistic reorganisation of agriculture has not resulted so much in increase and improvement of grain production as in greatly increased power of the government over crop disposition. A comparison has been made between collective farms with some element of co-operation, and wholly state farms, and it would appear that the former have been more successful than the latter in stabilising their position and improving their practices. The state farms failed to increase wheat production in semi-arid regions and, as a result, governmental efforts have recently been directed toward expansion of wheat in more humid regions and toward the increase in yield per acre. In humid areas, however, the scope for expansion is small, and even then only at the expense of rye. The general conclusion is reached that the Soviet government was able to accumulate substantial reserves of bread grains, and presumably has accumulated them. If, therefore, the government should decide to follow the policy of 1930-31 it could export substantial quantities of bread grain. Such action, however, seems improbable in the next few years. The unsatisfactory crop of 1936 must have slowed up the accumulation and may even have resulted in the consumption of some of the stocks. Moreover, the pressure on foreign exchange does not worry the Soviet as much as it did in 1930. In these circumstances it is hardly likely that Russia will be more

than a shadow influence on the wheat market. On the other hand, wheat is worth twice as much now as in 1931, and if Russia wants money she may unload again.

Milk and Bacon

We referred last month to the unsatisfactory nature of Mr. Morrison's statement on agricultural policy. In the debate on the Estimates Mr. Morrison's remarks did not clarify the situation. He said that there was general agreement that the milk scheme required amendment, but there was not the same consensus of opinion about the form which it was to take after amendment. Then he tried the old red herring stunt by saying that the necessity for reform should not blind them to its achievements in the past. One might just as well say that a hardened criminal had once been a nice, innocent little boy. He said that it had given the producer a safe market for his milk—but producers don't want a safe market at a loss. All this talk about the milk market collapsing if the scheme had not been inaugurated is unsubstantiated by fact and is purely the invention of those responsible for its creation. In regard to pigs he again had to confess that the situation was difficult and complicated. He had to admit that although he had received many representations from boards and others concerned, so far he hasn't been able to make up his mind. It is high time he made up his mind. This lethargic policy is slowly strangling the industry, and unless something drastic is done quickly the position of farmers and consumers alike will be chaotic.

Sugar Profits

Sugar users will have noted with very great interest the remarks made by Sir Francis Humphreys, the chairman, at the general meeting of the British Sugar Corporation. We referred at the time to this Corporation, which was formed by the amalgamation of all the beet factory interests, and stated then that it was absurd that shareholders should derive dividends from a subsidised industry. During the first half year there has been a net profit of £555,000 and the initial dividend of 4 per cent. is well covered. Last year the sugar beet industry received 2½ million pounds in subsidy, and yet the shareholders will receive a dividend of 4 per cent., which is more than many holders of Government securities get.

We think that any profits from a subsidised industry should be set against the subsidy. Of course the sugar beet farmers would like some of the pickings as well, and they state that the factories could afford to pay a higher price for beet than they have done.

Our Shop Assistants

"The retail sales force of this country has some magnificent qualities", said Mr. Dennis Catesby at the annual conference of the Incorporated Sales Managers' Association at Bournemouth. "It works very long hours and it receives a comparatively small remuneration. When you consider the remuneration that is received you must marvel at the tact and patience which it shows, but there is no question that it is often sadly lacking in technical knowledge and seriously deficient in the fundamental qualities of selling ability."

Mr. Catesby suggested that few manufacturers seemed to consider them as a vital link in the selling chain, and he urged that the association should carry out a searching investigation into the subject of retail salesmanship. "I cannot help listening to you individually describing the subtleties of your merchandise without realising", he said, "what a tragedy it is that the public never get a chance fully to appreciate them. It is utterly futile for you to produce the best products, it is utterly futile for you to have the most able of travellers if the last link breaks down."

Somewhat of a jeremiad. The question arises, "Is technical knowledge needed?" In the food trade, for the most part, products are already sold as soon as the customer enters the shop. In the case of many articles, nouns denoting their names are disappearing from the language of buying. Who, for instance, contemplates going into a shop and asking for a packet of cigarettes? The shop assistant merely hands out what the customer, insistent on his or her favourite brand of anything, asks for. Furthermore, in the majority of cases, if that particular brand is not available, a substitute will not be accepted. Such a state of affairs must cramp the style of the most technical and subtle of salesmen.

Gastritis

Stomachs were well represented as reasons for the recent busmen's strike. Various causes of gastritis were put forward: petrol, mental strain, irregular meals, and so on.

A report on an investigation into the sickness of London Transport Workers has just been issued. Sickness data are given for workers of different age limits and are analysed with reference to total sickness and the percentage of sickness of gastric origin. The results are summed up thus: "Taking

only sicknesses of over two weeks' duration and a wide group of diseases attributable to gastric causes, it is found that there was, in 1933-1935, some excess of gastric illnesses recorded among the omnibus workers in those age groups in which the majority of the former belong, though at these ages the total sickness experience, from all causes, of the omnibus workers was rather more favourable than that of the tramway workers.

There seems a snag in this, to the lay mind. The standard of comparison for the omnibus worker was the tramway worker. Personally, the idea of driving either a bus *or* a tram would give us the belly-ache. A set of statistics taking some other standard of comparison—say the workers in a large machine shop, men doing strenuous manual work but doing it under entirely different mental atmosphere—would better appeal to our mind.

Apart from that, these statistics cannot take into account the huge army of chronic gastric cases. They are very common to the observant eye. A good proportion of the disagreeable people met with have stomach trouble. This aspect has been neglected in the new Divorce Bill. A clause providing for medical examination for gastritis would have been useful. Healthier epithelial cells have oft-times changed a termagant into a ministering angel, and a brutal husband into a strong, silent man.

Examination of Imports

We have recently come across some interesting instances of mistakes by various customs authorities, showing how difficult it is to check the composition of imported products. In the latest case which has come before us, a preparation has been imported into this country for some years with a declaration that it contained no less than five constituents of the United States Pharmacopœia and one from the Mexican Pharmacopœia. In reality none of the preparations are in any pharmacopœia, and the product is one which it would be so difficult to examine that it would be practically impossible to state what it did contain. In another instance an importer was prevented from sending into the country tinned fish because he announced on his label that they were preserved with benzoic acid. When we investigated his complaint that other packers of the particular article also used benzoic acid, we found that he was correct, but they did not shout about it. When a certain country issued a list of permitted dyestuffs a British firm of manufacturers found it impossible to obtain the desired tint with the permitted dyestuffs, because they invariably bleached at the temperature of boiling. A prohibited dye was therefore added as well as the permitted one and only the latter was declared. Owing to the difficulty of checking up, the sweets were admitted into the country to which they were sent without hesitation. In another instance the goods of a firm have been stopped in another country because it appears to be impossible to persuade the customs authorities of that country that in this particular instance the firm is making a true declaration, and that in reality it is the tests of their chemists which are at fault. The situation is difficult, but it shows that British manufacturers should watch imported products to see that they do comply with the standards of the British law if they are to safeguard their own interests, and it also shows that they may have to form some definite organisation to watch over their interests, when they wish to export to any particular country.

Price and Consumption

At a meeting in June of the National Union of Retail Confectioners held at Lincoln, it was mentioned that the reduction of prices was very serious and every one meant a reduction in profit.

It was also mentioned that the manufacturers would argue that if they reduced the price of any article it would induce the people to buy more. The speaker (Mr. Oughtibridge, of Bradford) said that in his twenty-five years of experience in the trade he had always found that if prices were reduced the turnover went down. They would not find their customers ready to buy an extra quarter when the price was reduced from 6d. to 4d.; they bought the usual quantity and spent the saving elsewhere.

Since June, retail prices for certain confectionery have moved upwards. What happens with the consumer? We know that the rise is not anything like the reduction cited, but the fact remains that there is a difference in each purchase. If the analogies with beer and bacon are good ones, then increased prices tend to reduce turnover. Hence the retailer would seem to be between the devil and the deep sea. If the consumer, despite the extra price, still buys the same amount of confectionery, then some fellow in another trade is losing the extra ha'pennies. But, as we suggest, the probability is that in the long run, when prices go up, consumption goes down. Prices are never stable, so that it seems, whether they go up or down, the repercussion upon the retailer is adverse. It's a hard world!

The Story Behind the Name

One hundred years — the "hungry forties" — purity and quality — the human element — the microscope — 24 million gallons of milk — social service.

1. The Cocoa Factory, Bournville.

CADBURY

By

T. Crosbie-Walsh, F.I.C.

A LITTLE more than one hundred years ago, the seed of an idea entered the head of young John Cadbury, a tea and coffee dealer of Birmingham. This seed germinated to the accompaniment of a pestle and mortar in a small back room attached to the shop and has its fructification in Bournville—with its 10,000 employees, its 75 acres of works, its amazing organisation and its complete reference to every side of the working life of its people.

It was in 1831 that John Cadbury rented a warehouse in Crooked Lane, Birmingham, to put into practice on a modest industrial scale those small experiments in the grinding of the cocoa bean. It is not claimed that John Cadbury was the first maker of chocolate and cocoa. Chocolate was a fashionable drink in Pepys's time and he records this by an entry in his Diary dated 1664 which reads: "To a coffee house to drink jocolatte—very good." As a matter of fact, chocolate had been made by machinery before John Cadbury's time, but he went through the whole range of manufacturing experience from the pestle and mortar stage and evolved his own methods.

Chocolate sold in the eighteen-thirties was for drinking. Chocolate for eating is a comparatively modern invention, and as such was probably not manufactured in England until Queen Victoria's reign. French eating chocolate was imported for many years prior to its manufacture in this country, and in 1842, in his earliest surviving price list, John Cadbury announced a "line" of that name, which was presumably manufactured by him from a French recipe.

First Extensions

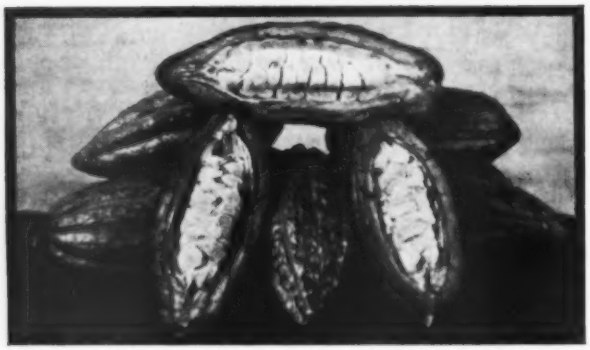
In 1847, the Crooked Lane factory was removed to Bridge Street (which still exists in Birmingham), this coinciding with the entrance of Benjamin Head Cadbury, the founder's brother, into the firm henceforth called "Cadbury Brothers." For thirty years this was to be the home of the business.

The Bridge Street concern flourished satisfactorily despite a period of acute national distress. Things were not easy in the "hungry forties", but within seven years Cadbury Brothers had received the Royal Appointment as Purveyors to Her Majesty Queen Victoria.

The fifties saw material developments in the range of products manufactured and the first appearance of the now familiar chocolate *crèmes*. Milk chocolate is now by far the largest selling variety of chocolate, and Messrs. Kaiser of Berne, in their interesting *Schatzkästlein*, published in 1927, make a public acknowledgment to England

2. ". . . raw cocoa is grown on the Gold Coast and other countries."

3. A typical cocoa tree.



4. ". . . the pod consists of a rind enclosing 30 or 40 beans."

of the honour of its introduction. The invention was attributed to Sir Hans Sloane, a famous English botanist and physician. Cadbury's, although acknowledging the influence of Continental manufacturers, may congratulate themselves that from 1849 to 1885 they made a milk chocolate "Prepared after the original recipe of Dr. Hans Sloane", though undoubtedly this was for drinking, not eating.

In 1861 John Cadbury handed over the management of the business to his two sons, Richard and George.

New Departures

In 1866 a new departure was made. Hitherto cocoas were admixed with potato and sago flour or arrowroot to counteract the excess of "butter" contained in them. Instead of trying to neutralise the effect of too much fat, Cadbury's eliminated the excess by pressing, and thereafter offered their product—which they called Cocoa Essence—as "Absolutely Pure, Therefore Best". It was a good slogan and served the firm well. When the Adulteration of Foods Act was passed in 1872 it was made incumbent on manufacturers to state clearly the fact of any adulterants with their commodities, and Cadbury's were able to make due capital of the fact that their Cocoa Essence was already pure.

In 1879 the firm were looking around for yet another and larger site, and they fixed upon Bournville, four miles from the centre of Birmingham, not without criticism from the leading business men of the day, who could not visualise an industry removed from the services of a town.

The rapid growth of the Bournville factory must perforce be passed over briefly in this survey, but its story is one of rapid and almost spectacular development, culminating in the astonishing organisation of to-day. In an article such as this, it is difficult to find space for a detailed account of the present members of the firm. Suffice to say that the Chairman of Directors is Mr. Edward Cadbury, the eldest son of the late George Cadbury; that all but one of the directors are direct descendants of the founder, and that all carry on his fine traditions.

The history of the family is an epic of indefatigable work against what were at times heavy odds. From the first the firm recognised the right of their workers to a full life of their own. This ideal has been carried on to the present day until it might well be called Utopian.

Sources of Cocoa and Chocolate

Raw cocoa is grown on the Gold Coast and other countries on the West African margin. Some is grown in Brazil, the West Indian Islands, Ecuador and Venezuela, and other producing countries include Ceylon and Java. The cocoa tree reaches a height of about 20 feet and bears its fruit in the form of pods. When cut through, the pod consists of a rind enclosing 30 or 40 beans. The pods are collected into heaps. The next process is to remove the beans from the pods. The beans are covered by a juicy pulp, which is removed by allowing it to ferment, when it runs away as a liquid. This fermentation process is a very important one and is carried on in different ways according to locality. Dry-

ing is the next process. This is generally done by natural processes, but where the locality is rainy artificial drying is resorted to, although drying in the open air produces the best results.

The development of cocoa-growing as a British West African native industry is largely responsible for the prosperity of the Gold Coast and Nigeria. What is known as the "Cocoa Railway" in West Africa is some 500 miles in extent, and there are now about 6,500 miles of motorable roads—all built during the past few years.

Manufacturing Methods

The essential processes of manufacture of cocoa are roasting (to develop the flavour), getting rid of the shell or husk, and grinding. The first grinding process at a suitable temperature produces a liquid paste, but the cocoa that remains after pressing out a certain proportion of the cocoa butter can be ground to a powder.

The actual procedure of treatment of the beans as they arrive in the Bournville factory is as follows:

The first step is to sort and clean the beans—removing bits of sacking, string, leaves, etc. This is done by mechanically operated sieves and air current.

The beans are then roasted over coke fires, gas jets, or super-heated steam. This develops the characteristic odour of the cocoa, due to the presence of a very minute proportion—6 parts per 10,000—of a substance called *d*-linalool. It is a very delicate and important process, this roasting, and although resort has been made to various instruments for controlling temperature, the eyes and nose of the skilled operator have been found the best means of control of this particular operation. In spite of the increased mechanisation of industry, there are still one or two angles of it where the eye (or nose) of the master is better than all our devices to ensure "the little more and so much it is". The roasted beans are then cracked between rollers into pieces called "nibs" and the shell winnowed away by powerful currents of air. The shell is used as cattle food and as a raw material for the manufacture of theobromine.

Grinding

The grinding process comes next, and when it is over the mass assumes a semi-liquid consistency. Here the raw material goes different ways according to whether it is destined to become drinking cocoa or eating chocolate. If it is to become the former, the semi-liquid cocoa mass is pressed in powerful hydraulic presses to extract a proportion of the cocoa butter, which is subsequently refined. Most of the cocoa butter is used in chocolate manufacture. The cocoa cakes are hard (containing 20 to 30 per cent. cocoa butter) and are broken up, ground, and sieved through a very fine silk gauze.

In the Bournville factory this fine cocoa is delivered automatically to the floor below, and enters the hoppers above each of a number of automatic filling machines. The whole process is a marvel of ingenious co-ordination of automatic and semi-automatic machinery, and the cocoa from start to finish is not touched by hand.

The ground cocoa is delivered into the tins by an automatic weighing machine. The tins themselves are lined with a paper lining, also by machine.

5. ". . . the beans are then roasted over coke fires, gas jets or super-heated steam."

6. ". . . the semi-liquid cocoa mass is pressed in powerful hydraulic presses. . . ."

7. ". . . the grinding process comes next."

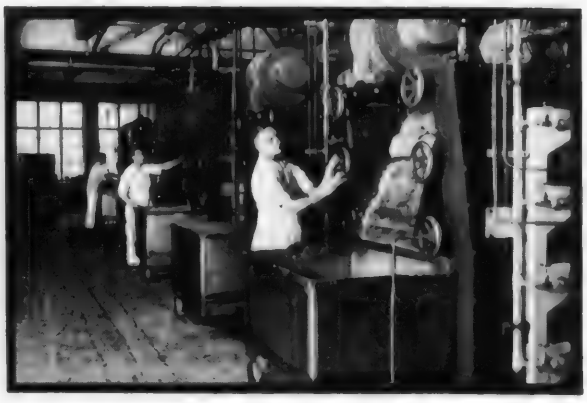
There are extensive tinshops at Bournville, and box, carton, and printing departments occupy a factory within a factory. In fact there are many factories within the main factory.

Eating Chocolate

The manufacture of chocolate, whether for eating or drinking, involves rather more elaborate operations than for cocoa. Chocolate consists of cocoa nibs in which the "butter" is retained, together with sugar and flavouring.

The first process is to mix the ground cocoa nibs with finely powdered sugar. Mixing and grinding are combined in one machine called a ***mélangeur***, in which heavy granite rollers revolve on a rotating granite bed. From this mixer the mass is delivered to the refining machine. This machine is somewhat like a domestic mangle, the rollers of which revolve at different speeds. The mixture is placed in the hopper at the bottom and delivered in a dry flaky form at the top. It is then re-heated to soften it, further cocoa butter is added, and it is re-passed through the melangeur and the refining processes as many times as necessary to achieve the quality desired.

The quality of eating chocolate depends in part upon the fineness of the particles of cocoa and sugar. After the processes described, it is subjected to a further refining process called *conching*. This is essentially a kneading process, and it has been found that, in order to obtain a high quality product, this process must be continued for from three to four days. Up to date, no method of shortening this period has been discovered.



8. "Chocolate grinding machines in which cacao 'nib' and sugar are ground together."

Eating chocolate has two forms—moulded chocolate such as blocks, bars, sticks, etc., and confectionery chocolate which is used for covering the nuts, *crèmes*, fruits, etc., which form the centres of an assortment.

For moulded chocolates, the required weight of chocolate "dough", with its added raisins or nuts, is deposited into a brightly polished mould and shaken by mechanical means until it fills the mould evenly and is free from air bubbles. When cold and hard it can be removed by a gentle tap, and is taken by a belt through a machine which covers it automatically with its wrapping of foil and coloured paper.

Confectionery Chocolate

For the confectionery chocolate a more liquid article is required, and this is obtained by the admixture of a higher percentage of cocoa butter. There are two methods of covering the centres. One is to dip them in warm liquid chocolate with a fork. The decoration of the coating is also made with the same fork, and the girls doing this operation are amazingly skilful in obtaining the necessary effect. The second method is machine covering, known as "enrobing". The centres are carried through a shower of molten chocolate on a wire belt through the meshes of which the surplus falls. When cool and set they are ready for packing.

The preparation of the "centre" is the work of skilled confectioners, who are continually devising fresh kinds and flavours. Marzipan is a very popular centre, and there is a large room entirely devoted to its preparation and shaping. The machine for making soft *crème* centres is very intriguing. A tray is filled with cornflour, in which are pressed rows of holes of the required shape. The trays move along a belt in a series of jerks, under a hopper fitted with a series of small pumps, through which the exact quantity of *crème* is delivered. When the *crème* is cold and set, the flour is knocked away and collected for further use, and the *crèmes* are conveyed elsewhere for covering.

Milk Chocolate

Milk chocolate is one of the most important items in the range of eating chocolates, and has not only become the most popular sweetmeat on the market, but is recognised by the medical profession as one of the most valuable foodstuffs available.

The manufacture of milk chocolate is carried out in the same way as that of ordinary chocolate except that the fresh full cream milk as well as sugar has to be incorporated with the chocolate mass. To this end, Cadbury's have established milk collecting and condensing factories in the heart of some of the richest dairy districts of the country, which deal with no less than 24 million gallons of milk per annum. It is a feature of the manufacture that the chocolate is brought to the milk factories and not the milk to the chocolate factory, and in this manner the milk chocolate is made within a few hours of the cows being milked.

Scientific Control

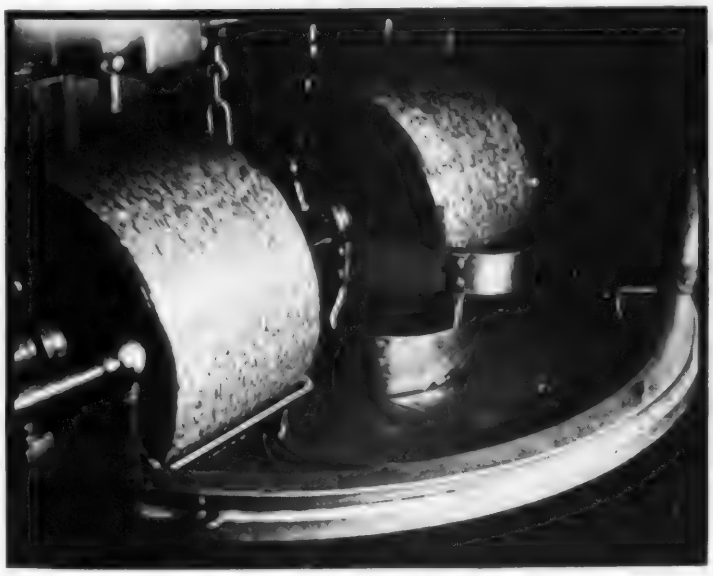
Cadbury's laboratories comprise a complete scientific organisation. The department is separated into sections —Research, Developments, Maintenance, and Bio-Chemical Laboratories; sections devoted to Fuel, Flavours, and Water, with Constant Temperature Room, Microscopical Room, and many others. Each section is headed by an expert in the particular branch. The staff consists of 47 people, 20 of whom are fully qualified, holding University degrees or being Associates or Fellows of the Institute of Chemistry. Those not possessing these qualifications are allowed special facilities for study whilst working in the laboratories.

As in the case of other departments, a whole book could be written on the work done in the laboratories, but necessarily the most superficial survey must be given here.

The grinding of the chocolate with the sugar is meticulously controlled. This is done by the microscope. Every stage of the grinding is controlled, and a glance through the microscope is sufficient to indicate the size of the sugar crystals. The fineness of the sugar crystals controls the smoothness of the finished chocolate.

Apart from the enormous range of tests of raw materials, semi-manufactured materials and finished products, a wide range of other tests are carried out. The fastness to light of the familiar coloured wrappers is ascertained by subjecting the paper to ultra-violet light for a period corresponding to subjection to normal light during a period of six months.

10. "There is a large room entirely devoted to the preparation and shaping of marzipan."



9. "Mixing and grinding are combined in one machine called a 'mélangeur' . . . ."

11. "One method is to dip the centres in some liquid chocolate with a fork. . . ."

12. The mass is "subjected to a further refining process called 'Conching.'"

13. "The machine for making soft crème centres is very intriguing."

Original Research

Much original research has been carried out in the Bournville laboratories, most of which has appeared in the principal journals of the Scientific Societies and the Scientific Press. The Chief Chemist is an authority in his own particular sphere, and several of his colleagues are prominent for the papers they have published and also for the interest they have taken in the professional societies.

Some of the work of the laboratory strikes the note of altruism which is so prominent in all sections of the company's activities. Although one could hardly credit any necessity for them, such matters as atmospheric pollution are studied. From time to time they are able to collaborate with outside institutions in research work, and an example of this was the work carried out on the Standardisation of the Measurement of the Intensity of Ultra-Violét Light in connection with its use in Ray Therapy. Some very active work has been achieved in the matter of the purification of milk effluents—a very urgent problem confronting milk factories.

Even the Dental Department has co-operated with the research department of the laboratories, and at present the effect of fluorine in drinking water is being studied in connection with tooth defects. The water of the various swimming baths of the company is constantly tested bacteriologically, and it would be difficult to find any branch of chemistry, physics, or bio-chemistry that is not represented by ardent and enthusiastic workers at Bournville.

The Social Side

A description of the social side of Bournville frankly leaves one gasping for words. It simply cannot be done justice to in an article of this length and scope.

The factory itself is full of surprises. We were conducted past the offices and suddenly, by the opening of a door, we found ourselves in a palatial swimming bath where some fifty bright youngsters were disporting themselves in properly conditioned water. These were the employees of 14 to 18 years who are taken into the service of Cadbury's on the condition that they spend one day per week at school. School consists not only of mental exercises but bodily ones, of which swimming is one, and we were given some attractive examples of high diving and the "crawl stroke".

The whole gamut of educational, recreational, pensions, and other schemes are included. The fine theatre, with its organ, seats over 1,000 people, and operatic and dramatic performances are given by the appropriate societies. The playing-fields are vast in extent. In the lunch interval, as well as in the evening, the bowling greens, tennis courts, and cricket "nets" are busy. There is a fine clubhouse, and the most recent addition is a "Lido", started originally as a memorial to the late King George's Jubilee. It consists of a splendid swimming pool, with a paddling pool for the children. The water is purified by alumina, and then chlorinated by the most modern of plants. This Lido was opened on July 2.

The Catering Section is divided into two categories—Restaurants and Dining-rooms. The dining-rooms are

organised as cafeterias, where the customers serve themselves from the counters on which ready prepared dinners are displayed. For the restaurants there is a staff of waitresses. The restaurants seat about 600, and the dining-rooms 5,000. The food is daintily served, and patterned table cloths are provided, which are kept scrupulously clean by the users. After lunch, those employees who do not take a stroll on the terrace or in the sports ground, sit at their places with a book (obtainable from the well-stocked library which is open to employees at a nominal subscription of 1s. 6d. per annum), or knitting. Some indulge in a *siesta* with their heads on their hands, and others exchange the latest gossip.

Medical Services

There are medical and dental departments on the premises, and applicants for employment are medically examined before engagement. The dental department consists of three wholetime dental surgeons, four dental nurses, and one mechanic. Toothbrushes and powder are issued gratis to all under the age of 16, and free emergency treatment is available to anyone in the factory. A full description of these services is published by Cadbury's in a booklet issued by the Publication Department, Bournville Works, and entitled *Health in the Factory*.

The social welfare schemes are legion. Convalescent Homes, Assisted Holiday Schemes, Prosperity Sharing Scheme, Financial Assistance in House Purchase, Savings Bank, Sick Benefit, Pension Fund, Pensioners' Widows' Fund, are only a few of the activities in this direction.

The employees at Bournville share with the management to a considerable extent in the internal administration of the factory so far as it is concerned with working conditions. This is done by means of two Works Councils —one for men and one for women. For a full account of these the appropriate publication, *A Works Council in Being* (Publication Department, Bournville) may be consulted.

There are Discipline Tribunals which judge cases of breaches of Works Rules by combined representatives of Directors and Workers. There are even Minor and Major Tribunals, to the latter of which an employee may ask permission to appeal.

The Suggestion Scheme provides for prizes for those employees who put forward schemes for time-saving, waste elimination, and efficiency in processes or new ideas in any way connected with manufacturing and sales promotion, or bearing on the health, comfort, and safety of the employees themselves. As much as £100 has been awarded as a single prize on more than one occasion, and the annual amount distributed is several hundred pounds.

The foregoing merely skims the surface of the activities of Cadbury's organisation. In preparing these notes the author has culled freely from the wealth of publications issued by the company. He wishes to acknowledge the very free and courteous collaboration of everybody with whom he came in contact.

All the photographs in this article are reproduced by permission of Cadbury Bros., Ltd.

14. "The chocolate is brought to the milk factories. . . ." (Milk Condensing Factory at Frampton-on-Severn, Glos.)

15. ". . . the social side of Bournville leaves one gasping for words." The new "Lido".

16. "Cadbury's laboratories comprise a complete scientific organisation."

MANUFACTURER *versus* MOTHS

By J. Valentine-Backes, A.R.C.Sc., A.I.C., D.I.C.

Fumigation with Ethylene Oxide

The author describes a powerful weapon against one of the enemies of the food manufacturer. With the increasing use of Ethylene Oxide, no doubt some British chemical manufacturers will start its preparation. At present no British product is available on a commercial scale.

POSSIBLY ONE of the most noteworthy developments of the food industry during the past decade has been the rapid advance made in the number and variety of ready-for-sale packages in all branches of foodstuffs. The housewife has been educated to expect her biscuits, cheese, sugar, and numerous other commodities in factory-packed convenient units. The shopkeeper, whilst gradually losing his acquaintanceship with weights and scales, has to keep the utmost vigilance on the stock control of an ever-increasing multiplicity of lines that he has to offer, to ensure that his goodwill is not damaged by the sale of a package out of condition by reason of age, heat, or humidity.

Extensive research work by the scientist and engineer has helped to minimise the effects of these factors, and explanatory literature attached to complaint slips has made the man in the street aware of the damage that can be caused by excessive heat or dampness. But that same man in the street is not aware of the intensive battle behind the scenes between the scientist and the various insect pests which can contaminate a packaged food product.

Chocolate and Confectionery

Probably the chocolate and confectionery industry were the pioneers of the unit package, and it is in this industry that the greatest development of the idea has taken place. Unfortunately for the confectionery manufacturer, cocoa beans, other nuts, and dried fruit are particularly prone to the ravages of the Ephestia group of moths. The existence of this danger had been known for many years, but with the growth of the unit package of confectionery there was a corresponding increase in the likelihood of the development of one of the larvæ of these moths in the finished sealed package, with the resulting loss of customer's goodwill.

The seriousness of this development can be appreciated only by those who have found maggots or traces of maggots in packed foods, and by those manufacturers who have had to deal with such complaints, because whereas a maggot in an apple may be commonplace, to find a maggot in packed foods becomes abhorrent to the purchaser, yet the origin is similar in most cases, and the manufacturer is little more to blame than the fruit-grower. The fact, however, remains that with the increased popularity of packed foods it becomes increasingly important to eliminate this trouble, and as a result much research has been undertaken, and has been going on for a period longer than the average manufacturer might appreciate.

Research Work

Valuable work was carried out shortly after the war by Knapp and Wadsworth, and from 1926 to 1930 Dr. Campbell and Miss Noyes carried out important fundamental work under the auspices of the Cocoa and Chocolate Research Association. The general impression seemed to be that since the pioneer work showed that the application of moderate heat (140° for 30 minutes) rendered the cocoa sterile and that none of the phases of the Ephestia moth could survive the processes of chocolate manufacture, then all that was necessary to eliminate the trouble was to keep the moth away from the chocolate after it had set.

But this in the majority of cases was an extremely difficult problem. Numerous moth traps were available, but none seemed to be so effective as the humble fly-paper and the dregs in the operative's teacup! The high standards of cleanliness that one associates with the British food industry were maintained, but it is not possible to convert the average chocolate packing room

to a standard of cleanliness approaching that of a sterile operating theatre, and that transformation is the only one which will guarantee a 100 per cent. immunity from trouble. Nevertheless, valuable work was carried out by a special committee, set up in 1934 by the Manufacturing Confectioners' Alliance, which drew up a list of measures for the control of moth pests in factories. Close adherence to these recommendations will go far to minimise any risk of contamination.

At the same time as this work was going on, attention was also being paid to the primary sources of the trouble, the cocoa plantations abroad and the warehouses in which the cocoa was stored. The Empire Marketing Board entered the field when they realised the damage that insect pests would do to our food supplies if nothing was done to prevent their increase. The Imperial Institute began to work on the problem and, amongst other things, they commenced investigations on the use of fumigant gases. Two such gases were given particular attention.

Hydrocyanic acid gas was found to be particularly effective, but its extremely poisonous nature renders it only suitable for use on stocks in large warehouses which can be isolated whilst they are being treated. This method has already been adopted by some wharfingers, and it is now possible at certain wharves to have cocoa fumigated on landing by this method for a few extra pence per ton on the landing charges.

Ethylene Oxide

The second gas which showed a useful promise on investigation was ethylene oxide. Ethylene oxide is a colourless liquid boiling at 51° F. to give an inflammable vapour 1·7 times heavier than air. Pioneer work in the United States showed that this gas is extremely toxic to all forms of insect life and is equally destructive to the egg, larvæ, pupæ and adult forms. Its toxicity to human beings is said to be of the same order as that of ammonia in equal concentrations, but precautions should be taken on account of its inflammability, as in concentrations of 3 per cent. or over by volume an explosive mixture is formed.

A large amount of research work on the use of this gas has been carried out by Dr. Munro of the Imperial Institute Laboratories at Slough, who has shown that the toxicity is greatly increased with an increase in temperature of the fumigating chamber and recommends a minimum temperature of 65° F. In addition the Chocolate and Cocoa Research Association have carried out many tests and have shown that the gas will penetrate cardboard and paper and give an effective kill, thus rendering the fumigation of packed goods possible. They have also shown that there is practically no residual gas left in the fumigated goods provided they are efficiently ventilated after fumigation.

Backed by those findings of reputable authorities, use is now being made of ethylene oxide on a commercial scale. Unfortunately the gas is not yet made in England, and reliance has to be made on a German source of supply which is marketed over here under the trade name of "Etox." Etox is a mixture of ethylene oxide and carbon dioxide, and is supplied in steel cylinders, a useful size being that containing 7½ kilos.

The Fumigating Chamber

The fumigation chamber should be composed of a non-porous material. A metal chamber with a hermetically sealed door is the ideal, but quite satisfactory results have been obtained with a brick chamber, tiled or coated with a smooth-finished cement, and treated with a non-porous paint or cellulose. Such a chamber should have a tightly fitting door, similar to those employed in cold rooms, a series of ¼-inch pipe-lines, terminating in spray nozzles to distribute the gas equally through the chamber, and an electric fan to assist in the distribution and volatilisation of the gas and also to serve as a means of exhausting residual gas when the fumigation is complete. Since the gas is heavier than air the distributing nozzles should all be situated on the ceiling of the chamber, and the fan motor and all electrical equipment should be so constructed that no spark is given, in order to avoid risk of explosions. In addition, it is advisable to introduce a steam coil in order to raise the temperature above 65° F. in cold weather.

The goods to be fumigated are placed on racks, the chamber is sealed up, the fan switched on, and the gas is led in through a main tube to the pipe-lines from outside. The cylinder is placed on a scale pan and a weighed amount of gas is introduced, the recommended concentration being 2 to 4 lb. per 1,000 cu. ft., whilst the time of fumigation is usually 24 hours. After this period the shutters are opened and the fan again switched on to thoroughly ventilate the chamber prior to removal of the goods.

Tests

Tests have been carried out on chambers similar to the above which show that the gas speedily volatilises, and is present within an hour in the centre of quite dense masses of material in concentrations of up to 75 per cent. of the theoretical.

Such a method of fumigation can be adopted either for packed goods ready for distribution to the retailer, or for goods being received into the factory. It is advisable that all goods which are liable to infection should be fumigated prior to being received into the factory. Accordingly it is preferable that these chambers are erected on the outside of the premises near to the "goods inward" department. Thus, cases of nuts, dried fruit and the like can be received from the delivery van, placed straight into the fumigation chamber to undergo fumigation prior to being taken into the stores of the factory. By this means the manufacturer at least has some assurance that the goods being received into his factory are sterile, and thus the possibility of curtailing the moth trouble in the factory is brought about. This type of goods can be fumigated in the original package, the usual procedure being to place the case in the chamber and remove the lid.

Bulk Goods

Cases of walnuts, boxes of dried fruit and the like can all be packed inside the chamber, care of course being taken to see that they are reasonably well distributed and not too tightly packed, so as to allow good and easy

circulation of the gas. Thus cases should be splayed rather than packed one tightly upon another.

Similarly when handling packet goods ready for despatch to the retailer, these can be packed direct into the chamber in their final packing. In this case there is no necessity to remove the lid of cardboard or paper packages because, as already stated, ethylene oxide has been found to penetrate this type of pack.

Packages which are finally retailed in a completely enclosed package of moisture-proof wrapping should be fumigated prior to the moisture-proof wrapping being sealed, as this moisture-proof transparent wrapping material is coated with wax which would retard penetration.

Analysis of Gas

The concentration of the gas can be estimated by aspirating a known volume of the air from the chamber through a known excess of N/10 HCl saturated with magnesium chloride. Under these conditions the ethylene oxide combines with the hydrochloric acid forming chlorohydrin, and the excess acid is back-titrated with alkali, using methyl orange as indicator (1 c.c. of N/10 HCl = 0·0044 gm. of ethylene oxide).

For ordinary routine purposes this estimation of gas is of course unnecessary, but in order to get it on a strict economic basis it is preferable to find out exactly the quantity of gas necessary to give the correct concentration in the size chamber being used. Once this figure has been found the quantity of gas to be inserted can be standardised and the process becomes simplicity itself.

A Powerful Weapon

It will be seen that ethylene oxide is becoming a powerful weapon in the hands of the manufacturer in the battle against insect pests. It is in every way safe to use and no trace of flavour or taint is left behind in the goods. Ethylene oxide can be used for fumigating all types of foodstuff liable to insect infestation where heat treatment is not applicable. Thus by scrupulous attention to factory cleanliness and the use of ethylene oxide as a fumigant, the manufacturer can play his part in overcoming a menace which if it had been left unchecked might well have developed to extremely serious proportions with resulting effect on trade.

RECENT RESEARCHES on CACAO

Malaya.—Mr. J. N. Milsum, Acting Agriculturist, in his half-yearly report for July-December, 1936, states that a number of attempts have been made in the past to grow several types of cacao at the Central Experiment Station, Serdang, with no success. In April, 1934, a half-acre block of land was planted with cacao seedlings raised from seed collected locally. In this instance overhead shade was provided by establishing *Gliricidia maculata* before the seedlings were planted. The situation selected was a sheltered one. The largest trees have produced a number of sound fruits and show promise of thriving under the conditions obtaining. This is the first time that the Department of Agriculture has managed to establish cacao with any degree of success.

Trinidad.—It is suggested by work done (4th Ann. Rep. on Cacao Research, 1934, Imperial College Tropical Agriculture, Trinidad, 1935) that the seed in cacao pods stored at temperatures below 60° F. loses its vitality and that poor germination results from only a short storage at a temperature of 53° F. Deterioration was also caused by desiccation.

Work has proceeded at the experimental cacao farms of the Department. There is a definite lack of knowledge on the growth of cacao in Nigeria under what may be termed plantation conditions—*i.e.*, where regular spacing is employed, and one of the functions of these farms is to provide such knowledge. The native peasant farmers in the Western Provinces are very successful with their small patches of closely planted cacao and exceptional yields are obtained. Shade management is not so important on peasant farms. The young cacao is usually established through food crops. And, as a result of the very close initial planting, the heavy losses during the early years still appear to leave a more than adequate stand of cacao on any but unsuitable soil.

Present experience on the experimental farm suggests that adequate side shade during the dry season and during the months of medium rainfall, is the criterion for success in the establishment of young cacao. *Tephrosia candida* has so far given promising results; it is reasonably cheap to control, although slow to become established.

As regards the need for permanent shade trees and the most suitable varieties to employ, no definite indications can be expected for some years, but *Erythrina* and *Albizzia* spp. are under trial.—*Bull. Imp. Inst.*, XXXV (2).

NATIONAL MARK FRUIT PRODUCTS SCHEME

THE Minister of Agriculture and Fisheries has given notice of his intention to amend the Agricultural Produce (Grading and Marking) (Fruit Juice Syrups) Regulations, 1936.

The amending regulations extend the scheme, which has hitherto been confined to two grades of fruit juice syrups, by prescribing grade designations and definitions of quality for the following additional products—fruit juices, fruit concentrates and aerated fruit beverages.

In addition the definitions of quality for fruit juice syrups have been amended.

Copies of the draft regulations may be obtained from His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C. 2, or through any bookseller, price 2d. each (postage extra).

THE LATEST VITAMIN

(FROM A SPECIAL CORRESPONDENT)

UNTIL 1936 the nomenclature of vitamins had not proceeded further along the alphabet than the American G. In a letter to *Nature* of July 4 last year, S. Rusznyák and A. Szent-Györgyi, of the University of Szeged, Hungary, announced the discovery of a new vitamin upon which they conferred the tentative title of vitamin P. This newly discovered substance appears to be found in association with vitamin C in lemon juice and in Hungarian red pepper. In a communication to *Nature* of November 7, the same authors, with A. Bentsáth, suggest that experimental scurvy, as commonly known, is a deficiency disease due to the lack of both vitamins C and P. In yet another letter to *Nature* (December 19) V. Bruckner and Szent-Györgyi report on the chemistry of citrin, which seems to be vitamin P under another name.

Vitamin P, as we shall continue to call it for the present, is a flavon or flavonol glucoside. It belongs to the group of vegetable dyes. Other vegetable dyes, it is suggested, may have a vitamin-like action. Vitamin P appears to have a specific action upon the permeability of capillaries. A daily dose of 40 mgm. of a fraction containing practically pure vitamin P restored the normal human capillary resistance after a fortnight: spontaneous bleeding ceased, the capillary walls lost their fragility towards pressure differences, and there was no leakage of plasma protein from the blood-stream.

Vitamin P was found to be of value in the vascular type of hæmorrhagic purpura, as well as in various septic conditions, marked by an increased permeability to the plasma protein only. The vitamin nature of the new substance was demonstrated by experiments with guinea pigs not receiving vitamin C. After a time the animals showed signs of vitamin C deficiency, but their condition was different according as to whether they had had vitamin P or not. Those animals not receiving vitamin P had more extensive hæmorrhagic disturbance than those which did receive it.

In the absence of further published work on the sources of vitamin P, discussion beyond the limits of the contents of these letters to *Nature* must be highly speculative. It is, however, tempting to remark that the kidney vetch (*Anthyllis vulneraria*) has long had a reputation for being of service in curing certain kidney conditions in which permeability may be supposed to be a factor; and that this vetch has intensely yellow flowers. The term "flavon" implies a yellow dye.

In a recent issue of *Food Industries Weekly* appeared a letter from a grower of grape-fruit in South Africa asking whether there was any recognised curative virtue in grape-fruit pips. This grower found that her seeded grape-fruits were almost unsaleable, as the demand was for seedless varieties. She had, however, reduced a glandular swelling of long duration by drinking an infusion of her own grape-fruit pips, and wondered whether anything further was known about the medicinal value of the pips.

Actually, very little is known about the components of any kind of pip, though the fixed oil of several species has been examined. The only examination of citrus pips ever performed from the point of view of their vitamin content seems to be that recorded by A. L. Bacharach and others in the *Biochemical Journal*, 1934, vol. 28, p. 1038. These authors did not examine grape-fruit at all, but for four varieties of citrus fruits they found it true to say that the vitamin C content decreases from the outside inwards: the peel, strange as it may seem, contained the most; the albedo (the white "pith" or skin) contained more vitamin C than the celebrated juice, but the pips contained no appreciable amount.

The experience of the South African grower of grape-fruit suggests that she *may* have imbibed an adequate dosage of vitamin P in her decoction of pips. As already noted, this is pure speculation, and indeed it depends on at least two "ifs". If vitamins C and P are inseparable in their origin, we can expect to find very little vitamin P in ungerminated seeds of any kind. It would, therefore, be interesting to know whether vitamin P is contained in citrus pips—especially those of grape-fruit. A new value for a despised article may possibly be demonstrated.

THE JELLING POWER of PECTIN

A NEW, rapid, cold method for measuring the jelling power of pectin extracts has been used for testing various pectin preparations. An extract containing 3·5 to 3·8 per cent. calcium pectate proved noticeable jelling of the standard test solution began in less than a minute, and in about five minutes the jelly was thick enough to cut with a knife. A thick pectin preparation with 1·7 to 1·9 per cent. calcium pectate required several minutes for noticeable jelling and about ten minutes to set the jelly. Its final consistency was fairly stiff but not hard enough to cut.

A thin pectin preparation (0·8 to 0·9 per cent. calcium pectate) thickened the test solution, but was not able to convert it to a jelly. Since pectin preparations gradually lose jelling power with age, even though their calcium pectate content remains the same, a reliable and convenient method for testing is much needed. The test solution used in the new method is a fruit preparation of creamy consistency, containing no alcohol and no sugar. (Its composition is not stated.) The test requires no boiling, is inexpensive, and requires little time (*Chemiker-Zeitung*, 61, **49**, 1937; *Food Industries*, April, 1937).

THE MANUFACTURE OF CHEWING GUM

A notice hanging in a Leyland, Lancs, public hall bears testimony to the widespread popularity of the chewing habit in England.

By Harry Barron, Ph.D., B.Sc., A.I.C., A.I.R.I.

THE RETAIL value of the chewing-gum products sold in this country is something of the order of £1,000,000 per year. Although this pales into insignificance before the U.S.A. figures, which have been as high as £23,000,000 per year, the consumption of chewing-gum in Great Britain is steadily growing, due presumably to the steady pressure of advertising. There can, therefore, be no doubt that the subject of chewing-gum as an industry deserves some consideration. Technical literature is almost entirely devoid of any reference to chewing-gum, which consists of a base of chicle gum, to which has been added sugar and flavouring materials.

Romance of the Industry

The development of the chewing-gum industry was quite romantic. Nearly all chewing-gum is still prepared on a base of chicle, which is a coagulated latex, exuding from the *sapotilla* tree found in Mexico. It is known that the population of these parts have for many centuries chewed this gum. It was definitely an Aztec and a Mayan custom, subsequently carried on by the Mexican population. Legends state that the Spanish *conquistadores* attributed the flashing white teeth of the Aztec maidens to this custom.

The appearance of chewing-gum as a marketable product was quite accidental. A Mexican, exiled during one of the interminable civil wars, was living on Staten Island, and had brought with him a supply of chicle to while away the time. When he departed he left some of this behind. It was found by Adams, who, thinking it was rubber, tried to vulcanise it without success. Recollecting the incessant chewing of the Mexican, he tried to chew it, and was pleased with the effect. There is no information as to why he should have regarded it as a saleable material, but apparently he rolled some of this into sheets, cut it into strips and sent it to a sweet store in Jersey City. It became immediately popular, and, as a result, the original firm of Adams and Sons was formed.

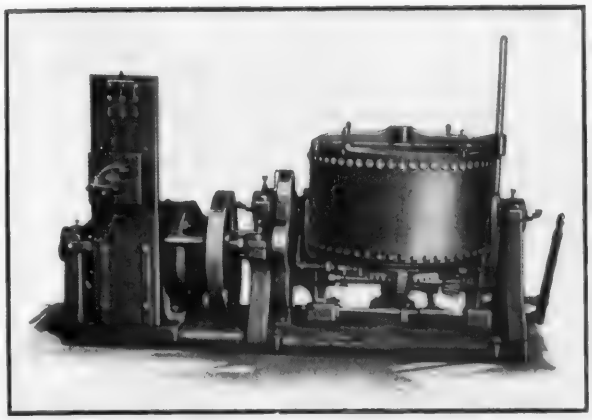
In 1871 Adams took out the first patent for a gum-making machine. Just about this time, too, he discovered that he could add sugar and flavouring materials to the gum, which attained a new popularity. The surprising feature about this is that prior to that time the gum was selling in the raw state.

In 1899, when several firms had already appeared on the scene, Flint, the trust organiser, merged them to form the American Chicle Co. Wrigley, who pioneered spearmint gum, designed the familiar wrapper himself in 1906. Spearmint and peppermint have always been, and still are, far away the most popular flavours.

In the vast gum industry of to-day it is estimated that 95 per cent. of chewing-gum in the U.S.A. is made by the three producers, Wrigley, Beech-nut, and the American Chicle Co. In England, Wrigley and Beech-nut are far in advance of any competitors, although in recent years many other firms have appeared on the market.

Consumption

A fairly good idea of the spread of the chewing-gum habit may be derived from the following figures. As



Patented tilting gum mixer direct connected to motor, by the Clough and Witt Machine Co., Cleveland, Ohio.

recently as 1914, only 29 sticks of gum were consumed per head of the U.S.A. population during the year. In 1925 consumption reached 100 sticks. In 1929 it reached the peak value of 109 sticks per head, a figure which is once again being approached. This vast quantity of gum gave about 90,000,000 lb. of finished products of a nominal retail value of £23,000,000.

Chewing-Gum in England

The chewing-gum habit really arrived in England with the soldiers returning from the war after having come into close contact with the American soldiers. Children still constitute the greatest purchasers of chewing-gum, although it has now achieved an established popularity among grown-ups. It is favoured by all classes of athletes, and by onlookers at all sporting events. During the summer, one English firm claims to sell a million packets per day. If this figure is, however, taken to represent a daily average for total sales of chewing-gum, then the consumption per head of the population works out at about 40 pellets. In England, chewing-gum is more popular in the pellet form, whereas in the U.S.A. the stick holds the market.

Difficulty in obtaining Chicle

Chicle gum is virtually monopolised by the American chewing-gum manufacturers. Comparatively little appears upon the open market. The only parts of the world where the *sapotilla* tree grows are Mexico, Nicaragua, and Guatemala. It does not seem to grow in any other parts of the world, and, so far, few efforts have been made to acclimatise the trees elsewhere. Owing to the spread of the chewing-gum habit to other parts of the world than the U.S.A., a demand has arisen for chewing-gum base which cannot be satisfied by chicle owing to the restricted supply. The chief British manufacturers appear to obtain their supplies of chicle gum by arrangement with those American firms with whom they are connected. As a result of this shortage, other interested manufacturers have had recourse to synthetic material designed to replace natural chicle gum. Greatest activity in this direction has, of course, taken place in the U.S.A.; however, European demands have led to the development of synthetic materials both in Great Britain and in Germany.

Requirements of a Substitute

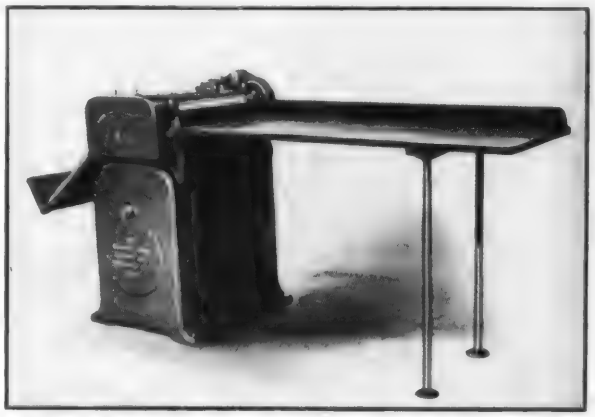
The essentials of any chewing-gum base are that it should be tasteless, odourless, non-tacky, thermoplastic, and very slightly elastic. It should be ductile when soft, and must not deteriorate or grow mouldy in storage. Quite obviously it must be harmless.

Use of Rubber

In the past many attempts were made to produce satisfactory products by modifying other natural products which appear in their properties to lie between chicle and raw rubber. Among such materials are Pontianac, Gualeye, and Jelutong, which are regarded as inferior rubbers. Gutta-percha and Balata have also been tried. Most efforts, however, have been directed at modifying the properties of raw rubber by the incorporation of resins, oils, waxes, and fats. It has proved exceedingly difficult to prepare products of commercial value. The various patented methods based on raw rubber have invariably yielded results which have suffered from serious disadvantages. It has been established beyond reasonable doubt that raw rubber is not affected by the gastric juices, and produces no harmful results if swallowed, although this is not recommended. In passing, it is interesting to note that there is a patent by Smith, B.P. 191,839/23, to obtain gutta-percha or other rubbers from leaves by feeding them to animals and washing the excreta, by which means he recovered the gum.

Patent Synthetic Chicle

Dunham seems to have been one of the first to strike out on the line of employing rubber as the main material. He proposed to mix rubber with heated hydrogenated oils and various waxes. These materials had to have low melting points of the order of 52°-65° C. The temperature at which the rubber was added was 150° C. Subsequently (U.S.P. 1,534,929/1924), he claimed to purify the products obtained by treatment with sodium hydroxide.



Cabinet cutting and scoring machine, motor driven. Made by the Clough and Witt Machine Co., Cleveland, Ohio.

Four gang rolling machine for sizing chewing-gum. Machine made by the Boom Boiler and Welding Co., Cleveland, Ohio.

These methods apparently gave products having undesirable features, outstanding being a "burnt rubber taste." This was attributed to the use of too high a temperature, and in a patent (Triggs, B.P. 378,073/1930) it was claimed that by carrying out all operations at a much lower temperature no deleterious taste or smell was obtained. The procedure adopted was to mill the rubber at a temperature well below 120° C. During the milling hydrogenated oils were added. The mixture was then placed in a steam-heated internal mixer and brought to a temperature not exceeding 120° C. Further ingredients such as resins, waxes, and any further hydrogenated oils were then added. This, after being washed with hot water, was then a chewing-gum base. An example of a mix employed was:

Rubber	100 parts
Hydrogenated cotton-seed oil (m.p. 52-70° C.)	100 ,,
Coumarone resin	150-130 parts
Hydrogenated peanut oil	50-250 ,,

Other methods do exist, and the writer has a patent pending which achieves the same object in a somewhat different manner.

Latex Base

Latex has proved a most attractive starting material for many investigators. Canning (B.P. 347,376/1930) described an interesting method: latex (100 parts) of 35 per cent. rubber content is diluted with water (50) and is then added to a powdered coumarone resin (85), powdered hydrogenated vegetable oil (185) and cocoa powder (15). The mixture is worked in a steam-jacketed mixing machine, first cold, gradually warming up to 100° C. over a period of 2 hours, being stirred the whole time. After freeing from excess water, the mass is ready for sugar and flavouring materials. It seems that this was not quite good enough, for in a later patent (B.P. 357,350/1930) the same proposer creamed the latex and removed nitrogenous matter prior to subjecting it to the processes outlined above.

Zimmerli (U.S.P. 1,829,029/1931) mixed latex, a mineral oil and a suitable filler. He mixed the oil (15) with concentrated latex (10) and added this to wetted out carbon black (45). The mass was then worked out and dehydrated between corrugated rolls. Other suitable fillers were whiting and magnesium oxide. Different suggestions came from Snelling (U.S.P. 1,288,723/1918), who proposed to use chloro-rubber as an ingredient in chewing-gum. A later idea from the same source was to prepare a chicle substitute from natural rubber and the rosin esters from glycerol, glycol, or naphthol (U.S.P. 1,430,036/1922). Reed (U.S.P. 1,989,246/1935) made a chewing-gum base by adding an equal weight of masticated crepe rubber to polyvinyl chloride on a mixing mill.

Efforts have been made in other directions, not using rubber, to produce chicle substitutes. Snelling (U.S.P. 1,430,036/1922), in a further patent, suggested the use of ester gum and the related rosin esters of glycerol, glycol and naphthol. Crane (U.S.P. 5,513,802/1924) employed the benzyl acid of abietic acid for use in chewing-gum. Matheson (B.P. 280,247/1927) stated that chewing-gum can be manufactured from the condensation product by aliphatic vinyl esters and saturated oliphatic aldehydes by incorporating sugar and other flavouring materials. The condensation product used in the preparation of chewing-gum is tasteless and insoluble in water or saliva, and is not as sticky as chewing-gum. However, it possesses the desirable properties of gum chicle and does not harden on continued chewing.

Edible Resins

Carleton Ellis (U.S.P. 2,007,965/1935) produced edible resins, which could be used as chicle substitutes in chewing-gum compositions, by employing fruit acids such as malic or citric. Ellis also stated that a proprietary gum in the U.S.A. contained vinyl resin and sulphur as two of its ingredients.

Properties of Chewing-Gum

The intrinsic food value of chicle gum and any other similar gum is nil, since nothing is extracted from them which may conceivably pass into the system. The various ingredients which are added have different properties, and, of course, supply some food value. This, however, is merely incidental to the properties of chewing-gum. It has useful properties inasmuch as it has a sedative action, steadying the nerves. It is also stated to be of definite assistance to digestion because of the stimulus it gives to the flow of the gastric juices. Obviously, too, it maintains the teeth in a clean and healthy condition. As against this, it is habit forming, and is looked upon by many as being æsthetically objectionable.

Production of Chewing-Gum Confectionery

The production of chewing-gum sweets from the chicle or synthetic base is simple. In the U.S.A. chewing-gum is most popular in the form of strips, whereas in Great Britain sugar-coated pellets are more general.

Sugar, either glucose or icing sugar, is brought to the boil, at which stage the chicle gum is gradually added. The mass is thoroughly mixed and allowed to cool; while still plastic more sugar, together with flavouring materials, is added. After thorough kneading, the mass is rolled out to the desired thickness, the requisite strips stamped out and left overnight.

Formulæ

These formulæ have been obtained from *Skuse Confectionery*, p. 312 (Messrs. W. J. Bush and Co., Ltd.) They are said to be popular in the U.S.A.:

Gum 1.

Chicle	5 lb.
Glucose	15 ,,
Icing sugar	15 ,,
Oil of peppermint	2 ozs.

Gum 2.

Sugar	6 lb.
Glucose	3 ,,
Water	1 qt.
Icing sugar	1½ lb.
Caramel paste	3 ,,
Chicle	3 ,,

Gum 3.

Sugar	7½ lb.
Icing sugar	1½ ,,
Glucose	3¾ ,,
Water	2½ pts.
Chicle	3 lb.
White beeswax	12 oz.
Tolu balsam	4 drm.
Peruvian balsam	2 ,,

Pellets

For the production of pellets the materials for the centres contain a much higher proportion of gum than for strips, and must be firmer and stiffer in order not to be deformed during the coating process. The sugar coatings are superimposed in the same way as for Jordan Almonds and similar confectionery. That is to say, the centre is coated with a thin layer of suitable syrup which on evaporation leaves an even layer or shell of dry sugar. The process is repeated until the desired thickness is worked up.

Flavours

It is a remarkable fact that in Great Britain the only flavours that have wide appeal are peppermint and spearmint. Chicle gum is a very good base for flavours and retains them successfully, yet the field has narrowed down to these two. In the U.S.A., although the same flavours predominate, there are popular brands having different flavours, among them being pepsin gum, licorice gum, cinnamon gum, and a variety of fruit flavours.

Chewing-Gum in Pharmacy

Chewing-gum has also found service as a medium for pharmaceutical purposes, since drugs can be quite easily incorporated. There are well-known brands which are intended for dental purposes, others for digestive troubles and constipation, and others which contain aspirin.

IMPROVED DIASTATIC MALT EXTRACT

In recent years bakers have been requiring a higher diastatic power malt than was formerly demanded. Extracts having a 60° Lintner strength were generally used, now malt extracts having a standardised diastatic power of 120 are most important. Like most commercial extracts, this 120 diastatic power malt is of a syrupy character and has a specific gravity of about 1·4, writes A. L. Nugey in *Food Industries*, May, 1937. In the baking industry the use of diastatic malt has a threefold purpose. Up to 45 per cent. of the sugar generally used in breadmaking may be reduced by the use of malt extract. Shorter fermentation time (12½ per cent.), and approximately 7½ per cent. greater loaf volumes are obtainable, while the crumb texture and crust colour are improved. Flavour, mineral salt content, vitamin and digestible protein content are among the benefits obtained through the use of malt extract in bread making.

In making this new type of malt extract, after the malt has been ground, it is mashed in with enough water at about 140° to 145° F. to give the mass the consistency of thin porridge. The temperature and hardness of the mash water are highly important, and the temperature range given is that of maximum enzymic activity. Temperature of the mash must not be raised above 155° F., similarly with the sparge water. The mashed-in malt is held in the mash tub for about 115 to 130 minutes to ensure complete conversion of the starches into maltose and dextrins, an iodine test is made to determine the completeness of the conversion, and the wort is drained off. Residues are then sparged, and this water also drained off into the drop tub. This wort should have a gravity of about 13° Bolling, and after settling is suitably concentrated.

The resultant thick, syrupy concentrate is run off to a blending vat equipped with an agitator, where the addition of several selected enzyme concentrates are added to give the desired standardised enzyme potency. This blending is carried out at 125° F., and continues with agitation.

Concentration of the 13° Bolling wort to an 80 per cent. total solids extract requires removal of 83¾ lb. of water for each 100 lb. of wort. Only 16¼ lb. of finished extract results. The water may be removed in various ways. But the enzymes of the extract must be preserved, as this activity is necessary in the finished product, thus the concentration must be accomplished at a temperature not exceeding 140° F. In practice a margin of safety must be provided for.

SUGAR

SUPPLY and DEMAND

By Lewis Eynon, B.Sc., F.I.C.

FOR THE past ten years the sugar industry of the world has been in a very depressed state, and during a considerable part of that period raw sugar has been marketed at prices considerably below the cost of production. It is proposed, in the following article, to give a brief account of the causes of the depression and of the means that have been tried for removing it.

Beet Sugar Discovered

Until the end of the eighteenth century the sugar cane had been the sole source of the world's supply. In 1747 Marggraf had found that the beetroot contained sugar, but fifty years elapsed before beet sugar was produced on the industrial scale by Achard, and then not very successfully. The nascent beet sugar industry would probably have perished but for the cane sugar famine consequent on the blockade of European ports during the Napoleonic war. With the re-establishment of peace the beet sugar industry was seriously affected by competition with cane sugar, but it was subsequently revived by State aid in France, Germany and other European countries. Owing in part to this State aid and in part to scientific research, it made such rapid progress that by the end of the nineteenth century beet sugar production was approximately equal to that of cane. In 1902 the bounties on beet sugar were abolished and thereafter cane sugar gained a slight ascendancy; of a total world production of nearly 19 million tons in 1913-14, about 10 million tons consisted of cane and 9 million tons of beet sugar.

War Influences

The economic disturbance of the Napoleonic war had favoured the development of the beet sugar industry and, necessarily, at the expense of the cane sugar industry; the economic disturbance of the war of 1914-18 acted in the opposite sense. The production of beet sugar fell to less than half the pre-war figure; the price of sugar rose to fantastic heights towards the end of the war and for a short time afterwards, and since most of the cane-growing countries were not belligerents, the cane sugar industry was correspondingly stimulated. Within a few years of the end of the war, however, the beet industry more than regained its pre-war output and, with the increased production of cane sugar consequent on the war, the total yearly production rose rapidly. Further, the post-war period has been marked by great increases in the yields per acre both of cane and beet, increases more remarkable perhaps than in the case of any other crop. The average yields which, until a few years ago, were of the order of $2\frac{1}{2}$ or 3 tons of cane and $1\frac{1}{4}$ tons of beet sugar per acre have been greatly exceeded in some countries recently.

A New Cane Variety

A few years ago a new cane variety—POJ 2878—was bred in Java capable of producing nearly 7 tons of sugar per acre; more recently yields of 10 tons of cane and of 5 to 7 tons of beet sugar over considerable areas have been recorded, and the extraordinary yield of nearly 23 tons of cane sugar per acre has been obtained under the most favourable experimental conditions in Queensland. In 1928-29 the total production of sugar amounted to 27 million tons, and in 1930-31 to nearly 29 million tons, or about 50 per cent. more than in 1913-14. This rate of increase was considerably greater than the rate of increase in consumption during the same period, the result being that the industry has found itself burdened with a stock of sugar the existence of which has reduced prices below the cost of production.

The Chadbourne Agreement

In order to remedy this unsatisfactory state of affairs the leading beet and cane sugar exporting countries made an Agreement in 1931—the Chadbourne Agreement—to limit production in order to maintain the price of sugar at an economic level; the plan failed in its object owing to a number of adverse factors. The world depression which began in 1931 and has not yet been completely dispersed, affected the consumption of commodities in general and of sugar in particular, thus upsetting the estimates of consumption on which the Chadbourne Agreement had been based. Further, the sugar-producing countries which had not been parties to the Agreement increased their production, to the great detriment, of course, of the countries which had signed the Agreement, and, a still more disquieting factor for the future of the industry, several countries which had not pre-

viously produced sugar began to do so with State support. In 1925 Great Britain, with the aid of the British Sugar Subsidy Act, began to develop a considerable beet sugar industry; this Act, the operation of which terminated in 1934, has been followed by the Sugar Industry (Reorganisation) Act, under which production equivalent to 560,000 tons of white sugar yearly is subsidised; this amount is nearly one-third of home requirements.

New Producing Countries

In 1926 the Irish Free State started a beet sugar industry and is now independent of external supplies, or nearly so. In 1932 India, which previously had produced very little refined sugar, encouraged this industry by the imposition of a tariff on imported sugar and now produces a very large quantity—about 800,000 tons—yearly. More recently, Turkey, Persia and China have entered the field. Whatever opinions may be held as to the merits or demerits of a policy of economic nationalism for individual countries, it is obvious that, from the international standpoint, it has proved wholly bad for the sugar industry. The world depression, the increase in sugar production by countries outside the Chadbourne Agreement, and the development of sugar industries in countries that had not previously produced sugar, conspired to depress the price of sugar, which fell from 13s. 9d. per cwt. (raw sugar) in 1927 to about 4s. 6d. in 1936, and the parties to the Agreement suffered both in respect of output and price. The price has since risen to about 6s. 6d. per cwt., but it has been estimated that raw sugar cannot be profitably produced at a price of less than about 7s. 6d. per cwt. The Chadbourne Agreement terminated in 1935, and it was obvious that to raise the sugar industry from the Slough of Despond into which it had fallen a much more general co-operation between the sugar-producing countries was required.

The April Conference

In order to effect this co-operation, a conference, at which nearly all the sugar-producing countries of the world were represented, was held in London in April of this year, and, as a result, an International Agreement to regulate the production and marketing of sugar was made. The Agreement will come into force on September 1st, 1937, if at that date it has been ratified by all the signatory Governments, or, alternatively, the Governments which have ratified the Agreement may put it into force among themselves; the Agreement is to continue for five years and may be extended for a further period. It will be under the administration of a Council —the International Sugar Council—consisting of delegates representing the contracting Governments and of an Executive Committee consisting of three representatives each of Governments of (1) importing countries, (2) cane sugar producing countries, (3) beet sugar producing countries. With regard to the general policy to be pursued under the terms of the Agreement, the chief objects are to assure consumers of an adequate supply of sugar at a reasonable price, to reduce disproportionate fiscal burdens on sugar, to encourage increased consumption of sugar in countries in which consumption is low, to check the abuses resulting from the substitution for sugar of substances having no comparable food value, and to encourage the search for new and alternative uses for sugar.

Regulation of Trade

The regulation of the exported sugar trade is the most important part of the Agreement. The obligations of countries not exporting to the free market are defined with a view to maintaining and, if possible, expanding the free market and export quotas for the free market (*i.e.*, the market which is not reserved for national production or for production enjoying preference duties) are allocated to certain countries. The free market total for 1937-38 is estimated at 3,622,500 metric tons. Of this total 1,050,000 tons are allocated to the Netherlands (including overseas territories), 940,000 tons to Cuba, 400,000 tons to the Dominican Republic, 330,000 tons to Peru, and 250,000 tons to Czechoslovakia, the balance of 652,500 being allocated among eight other exporting countries. During the first and second years of the Agreement the Council may reduce export quotas by a uniform percentage not exceeding 5 per cent., and in subsequent years the Council will recommend at any time whether and to what extent a reduction would be desirable. The Agreement also makes provision for the restriction of the stocks of sugar which may be held by the contracting Governments to which export quotas are allocated; in most cases the stock is limited to 25 per cent. of the country's annual production.

The Agreement marks an important stage in the economics of sugar production, and it should provide a permanent cure for the unsatisfactory conditions which have prevailed in the industry for years past.

ANILINE and o-TOLUIDINE in FOOD DYES

SMALL amounts of aniline and *o*-toluidine produce a strong yellow colour with calcium hypochlorite in alkaline solution, but only a faint colour in acid solution; 2-naphthylamine, on the other hand, gives a much stronger yellow colour in acid than in alkaline solution. The authors propose to determine the constituents calorimetrically in mixtures of small amounts of naphthylamine and aniline, or naphthylamine and toluidine, by first measuring the colour yielded by naphthylamine and hypochlorite in acid solution and then measuring the colour given when the solution is made alkaline. For accurate results, however, it is necessary for both constituents to be present in the standard comparison solution in approximately the same concentration as in the unknown solution, so that preliminary tests are required. Moreover, the quantities of calcium hypochlorite and alkali need careful regulation to ensure the full development of colour. The methods, for working details of which the original paper should be consulted, are applied to an acid aqueous extract of the intermediates from a benzene solution of the dye.—Evenson, Kime and Forrest, *Ind. Eng. Chem., Anal. Ed.*, 1937, **9**, 74-75; through *Analyst*, **62**, 397.

SOCIETY OF CHEMICAL INDUSTRY

FOOD GROUP MEETINGS

AT

STRATFORD-ON-AVON and HARROGATE

TWO MEETINGS within ten days of each other have kept busy the members of the Food Group in Stratford-on-Avon and Harrogate. The first meeting was exclusively Food Group; the second the Annual General Meeting of the Society, during which Food Group Sessions were held.

THE STRATFORD MEETING

The full programme at Stratford was as follows:

June 25th.—Train to Leamington; coaches to Stratford. Lunch at Welcome Hotel.

Visit to Metal Box factory at Perry Wood. Tea at Perry Wood Factory.

Reception and Dinner given by Metal Box Company, followed by informal gathering.

June 26th.—Tour of the Research Station at Chipping Campden. Meeting of Food Group, and reading of papers. Coach Tour of Cotswolds.

Needless to say, the visit to the Perry Wood 1½ million can a day factory afforded a spectacle which left the most *blasé* industrialist veritably intrigued.

In the evening the Group was entertained to a dinner at the Welcome Hotel, ably presided over by Mr. R. J. Cox, of the Metal Box Company.

On Saturday, a visit to the Campden Research Station revealed intensive activities. In the Dairy Research Room a complete model plant, including vacuum pans, separators, homogeniser and rotary retort was demonstrated. The Bacteriological Laboratory's work was of particular interest to the visitors, as current problems of the canning industry are being extensively tackled.

The Physical Laboratory offered many points of interest. Here such problems as heat penetration in cans, the measurement of pressures developed in cans during processing, and a host of other matters are receiving attention. The extraordinary ingenuity displayed in contriving apparatus for the study of the different problems was an outstanding feature of this section.

Dr. Franklin Kidd, Chairman of the Group, presided at the business session during Saturday morning, at which three interesting papers were read and discussed.

After the discussions on the papers, the members, many of whose wives had spent the morning visiting various places of interest in the neighbourhood, joined the ladies for lunch at the Ebrington Arms, Chipping Campden.

Later, the entire party ended the meeting with a tour of the Cotswolds.

The papers read were:

The Chemistry of Plant Gums and Mucilages

Professor E. L. Hirst, M.A., D.Sc., F.R.S., and J. K. N. Jones, B.Sc., Ph.D.,
University of Bristol

The complex nature of the polysaccharides, particularly the gums and mucilages, is being examined at Bristol, and from the nature of the paper given it is evident that successful results are emerging. The many structural formulæ shown on the screen conveyed a graphic representation of the nature of the breakdown product which could be obtained.

Orchard Factors Affecting Fruit Quality

T. Wallace, M.C., B.Sc., A.I.C.,
Long Ashton Research Station

Mr. Wallace explained how fruit quality could be controlled by the correct use of fertilisers, particularly nitrogen and potash; also by correct pruning, thinning, etc. The different sugars in fruits were mentioned, and also the special precautions to be taken with reference to cold storage of fruit.

The Tin Content of English Canned Fruits and Vegetables

W. B. Adam, M.A., A.I.C., and G. Horner, M.Sc., D.I.C.,
Campden Research Station

This paper was a summary of the work which has been carried out at the Station on the question of the incidence of tin in canned foods.

Details of this research were set out on a special sheet for the guidance of those present. It was shown that double lacquer materially reduced the amount of tin which goes into solution in fruit packs. The temperature of storage was also shown to be an important factor.

THE HARROGATE MEETING

The occasion at Harrogate was the Annual General Meeting of the Society of Chemical Industry. This was opened on July 5th by Lord Leverhulme, who, in the course of his Presidental Address, the title of which was "Science in the Service and Direction of Industry", said that scientific training was useful, not only to those following a technical calling, but to business men, as tending to produce habits of exact thought.

Lord Leverhulme stressed the amount of scientific research which is being carried out in every conceivable industry for its own purposes.

He suggested that, in any age of so much industrial research directed exclusively to the production of immediate results, the question arises whether we have not gone too far, at the cost of paying insufficient attention to scientific research of a more general character into the less developed sciences the social benefits of which, though more remote, may ultimately be no less valuable.

Nature (Lord Leverhulme continued) did not always observe the cardinal rule of marketing, which is to provide the right goods in the right places at the right price in the right quantities and at the right time. It has been left to the chemist to rationalise Nature and to produce synthetically those raw materials in respect of which Nature has failed to adhere to rules. The development of synthetic chemistry as applied to industry is indicative of an economic revolution the proximity and scope of which are as yet insufficiently appreciated. Man, largely independent of geographic or climatic environment, would rely upon the synthetic chemist as the universal provider of substitutes.

Among the papers which were read at the session of the Food Group on July 8th were:

Recent Work on Concentration of Fruit Juices and Fruit Drying

by Mr. J. Arthur Reavell

The concentration of fruit juices has become of great importance in recent years. One of the original difficulties had been the retention of the aroma during evaporation. The main points to be observed are the continuous nature of the process, the reduction to a minimum of the time and temperature of the heating.

The type of evaporator and its handling were described. Mr. Reavell alluded to the considerable tonnage of fruit in this country which is left to rot unpicked, and hoped that an effort would be made to remedy this waste and utilise natural products instead of having so much recourse to synthetics.

Fruit Juices and Syrups

by Mr. Vernon Charley
of the Long Ashton Research Station

Mr. Charley also commented upon the wide prevalence of synthetic flavours in soft drinks, other than those made from the citrus fruits. English fruit juices, although not so acid as the citrus juices, were made too sharp for consumption in the fresh state and were usually stored as syrup, except in the cases of apple and grape juices. The author went fully into the apple juice industry in Germany and other countries. Pure English apple juice had not been produced until last year, but it is hoped that by the autumn a satisfactory method will have been evolved at Long Ashton for the production of an attractive product from all types of apples, and that there would quickly be a flourishing counterpart of the German industry.

A scheme for fruit juice standardisation has been worked out between the Ministry of Agriculture and the National Association of Mineral Water Manufacturers, whereby National Mark syrups should have guaranteed composition and controlled price throughout the British Isles.

Another interesting paper, among many others read at the Meeting, exigencies of space for which preclude the possibility of mention in this present review, was:

Concentration of Fruit Juices by Freezing

by Mr. T. N. Morris

Mr. Morris described the methods adopted in Italy and Holland, which consist of separating the solid and liquid phases by draining and pressing. Experiments at the Low Temperature Research Station indicated that centrifugalisation of the ice crystals obtained by the freezing of fruit juices gave more satisfactory results. Full details of procedure were given.

Mr. Morris also dealt with changes occurring in fruit juices during storage.

THEY ALL WENT TO HARROGATE

On the opposite page FOOD MANUFACTURE reproduces the official photograph of the members and guests who attended the Harrogate meeting of the Society of Chemical Industry. Underneath will be found the complete list of members, their wives, and friends who attended.

ADDINGLEY, Dr. C. G., Cleckheaton; Aldis, Dr. R. W., London; Anderson, E. B., London; Andross, Miss M., Glasgow; Angus, G. B., Leeds; Applebey, M.P., Billingham; Applebey, Mrs. M. P., Billingham.

BAEKELAND, Dr. L. H., London; Baekeland, Mrs. L. H., London; Baker, Dr. S., London; Bamford, Mrs. I., Liverpool; Bannister, Prof. C. O., Liverpool; Bannister, Mrs. C. O., Liverpool; Barker, Dr. J. T., Liverpool; Barker, Mrs. J. T., Liverpool; Bennett, R. R., London; Billbrough, S., Knottingley; Billbrough, Mrs. S., Knottingley; Benton, W. A., Birmingham; Bhattacharya, Dr. R., London; Blackburn, R., Glasgow; Bradford, Miss E. A. M., King's Langley; Brearley, G., Bromborough; Brearley, Mrs. G., Bromborough; Brightman, R., Prestwich; Brightman, Mrs. R., Prestwich; Brindley, Dr. W. H., Glossop; Brothers, H. E., Old Colwyn; Brothers, Mrs. H. E., Old Colwyn; Brotherton, C. F. R., Leeds (Chairman, Yorkshire Section); Brown, H. B., York; Browning, H., High Lane, Cheshire; Bulcraig, Dr. W. R., Leeds (Hon. Assistant Secretary); Burton, Dr. H., Leeds; Burton, Mrs. H., Leeds; Burton, T. F., London (Editor of "Transactions and Abstracts"); Burton, Mrs. T. F., London; Butterfield, W. J. A., London; Butterfield, Miss, London; Butterworth, S. W., Leeds; Butterworth, Mrs. S. W., Leeds; Bywaters, Dr. H. W., Sheffield.

CADMAN, Capt. W. H., London; Calder, W. A. S., Birmingham; Calder, Mrs. W. A. S., Birmingham; Challenger, Prof. F., Leeds; Challenger, Mrs. F., Leeds; Charley, V. L. S., Long Ashton; Clark, F. W., Cheam, Surrey; Clark, K. Lamphier, Weston-super-Mare; Clemo, Prof. G. R., Newcastle; Cobb, Prof. J. W., Leeds; Cobb, Mrs. J. W., Leeds; Cole, R. J., East Twickenham; Cole, Mrs. R. J., East Twickenham; Colgate, Dr. R. T., Reading; Colgate, Mrs. R. T., Reading; Cooper, C., Huddersfield; Cooper, Mrs. C., Huddersfield; Cowen, W., Manchester; Cranston, Dr. J. A., Glasgow; Cranston, Mrs. J. A., Glasgow; Craven, J. A., Leeds; Cullen, Dr. W., Surbiton; Cunliffe, Dr. P. W., Leeds; Cunliffe, Mrs. P. W., Leeds.

DAMON, W. A., London; Denbigh, G. J., Wakefield; Denbigh, Mrs. G. J., Wakefield; Dent, Dr. F. J., Leeds; Diamond, C., Leamington Spa; Diamond, Mrs. C., Leamington Spa; Dodd, A. H., Sheffield (Chairman, Executive Committee, Yorkshire Section); Draper, P. W., Leeds; Draper, Mrs. P. W., Leeds; Dring, G., Birmingham; Dunbar, M., London; Duncan, J. G., Glasgow; Duncan, Mrs. J. G., Glasgow; Dunn, Dr. J. T., Newcastle-on-Tyne; Dunn, Mrs. J. T., Newcastle-on-Tyne; Dunning, Dr. E. W. B., Walton-on-Thames; Dunning, Mrs. E. W. B., Walton-on-Thames.

EASTWOOD, Miss, Manchester; Edwards, E. A., London; Elsdon, Dr. G. D., Preston.

FARRANT, J. C., London; Farrow, F. D., London; Feeny, H. R., Seer Green; Field, A. W., Barnt Green, Worcester; Findlater, J., Birkenhead; Findley, A. E., Liverpool; Findley, Mrs. A. E., Liverpool; Forrester, G. P., London; Forster, Prof. R. B., Bombay; Forster, Mrs. R. B.; France, H., Mirfield; France, Mrs. H., Mirfield; Freeman, Miss D., Eaglescliffe; Freeman, Mrs. H. W., Eaglescliffe; Freeth, Major F. A., London.

GARLAND, C. S., Bromley; Garland, Mrs. C. S., Bromley; Garner, J. H., Wakefield; Gaunt, P., Manchester; Gawler, R., Leeds; Gawler, Mrs. R., Leeds; Geake, Dr. A., Manchester; Geake, Mrs. A., Manchester; Gibson, F. R., Darlington; Gibson, Mrs. F. R., Darlington; Greene, F. A., London; Greene, Mrs. F. A., London.

HAIGH, B. Wilson, Derby; Haigh, Mrs. B. W., Derby; Hayes, D., Lancaster; Hayes, Mrs. D., Lancaster; Hayes, Miss M., Morecambe; Hayhurst, H., Manchester; Hayhurst, Mrs. H., Manchester; Heaton, N., Orpington; Heaton, Mrs. N., Orpington; Hedley, G. H., Bristol; Henderson, Prof. G. G., Glasgow; Henshaw, D. M., Huddersfield; Henshaw, Mrs. D. M., Huddersfield; Hilditch, Prof. T. P., Birkenhead; Hill, J. K., Glasgow; Hill, Miss, Glasgow; Hirsch, F., Southport; Hirsch, Mrs. F., Southport; Hodgson, H., Leeds; Hodsman, H. J., Leeds (Hon. Secretary, Yorkshire Section); Hodsman, Mrs. H. J., Leeds; Holdsworth, E. T., Leeds; Holdsworth, Mrs. E. T., Leeds; Holloway, Mrs. C.; Hopper, Dr. I. Vance, Glasgow.

JONES, E. Gabriel, Liverpool; Jones, Mrs. E. Gabriel, Liverpool; Jones, G. B., Huddersfield; Jones, Mrs. G. B., Huddersfield; Jones, T. W., London; Jordan, Dr. L. A., Surbiton; Jordan, Mrs. L. A., Surbiton; Jowett, H., Leeds; Jowett, Mrs. H., Leeds; Joyce, A. G. E., London; Joyce, Mrs. A. G. E., London.

KAY, Dr. F. W., Liverpool; Keyworth, C. M., Leek; Kidd, Dr. Franklin, Cambridge; King, G., Birmingham; King, Mrs. G., Birmingham; King, L., Birmingham; King, Mrs. L., Birmingham; Knight, H. F., London; Knight, Mrs. H. F., London.

LAND, H. S., Manchester; Land, Mrs. H. S., Manchester; Lampitt, Dr. L. H., Harrow (Hon. Treasurer of the Society); Lampitt, Mrs. L. H., Harrow; Lawton, Dr. G., Doncaster; Lawton, Mrs. G., Doncaster; Lee, W. R., Grantham; Leonard, J. M., Letchmore Heath; Leonard, Mrs. J. M., Letchmore Heath; Lessing, Dr. R., London; Lester, J. H., Eccles; Lester, Mrs. J. H., Eccles; Leverhulme, the Rt. Hon. the Viscount (President); Leverhulme, Lady; Lewis-Dale, Dr. P., London; Lewis-Dale, Mrs. P., London; Lloyd, Dr. L. L., Bradford; Lloyd, Mrs. L. L., Bradford; Lloyd, P. V., Cardiff; Lloyd, Mrs. P. V., Cardiff; Lomax, A., Bolton; Louden, C., Liverpool; Louden, Mrs. C., Liverpool; Lowe, Austin, Harrow; Lowe, Mrs. Austin, Harrow; Luke, J. K., St. Annes-on-Sea.

MACKIE, C. J. T., London; Macrae, J. C., Leeds; Macculloch, A. F., Edinburgh; Maiden, Dr. A. M., Manchester; Mallen, Miss C. E., Glasgow; Mann, J. C., Birmingham; Mann, Mrs. J. C., Birmingham; Mann, J. S., Langdon Hills, Essex; Marks, A. J., Bradford; Marks, Miss M., Bradford; Marsden, A., Bristol; Marsden, Mrs. A., Bristol; Marston, H. B., York; Marston, Mrs. H. B., York; Mason, Dr. E. D., Birmingham; Mason, Mrs. E. D., Birmingham; Mason, H. M., Leeds; Mason, Mrs. H. M., Leeds; Maunsell, Miss A. E., London; Maxted, Dr. E. B., Bristol; McArthur, I. K. H., Rock Ferry; McArthur, Mrs. I. K. H., Rock Ferry; McIntosh, Bailie D., Glasgow; McLaren, G., London; McLaren, Mrs. G., London; McLellan, B. G., York; McLellan, Mrs. B. G., York; McLusky, J. W., Glasgow; McNeill, G., Motherwell; McNeill, Mrs. G., Motherwell; Miall, Dr. Stephen, London (Editor, *Journal of the Society of Chemical Industry*); Miners, Miss M., Westcliffe; Monkhouse, Dr. A. C., Bristol; Monkhouse, Mrs. A. C., Bristol; Monypenny, J. H. G., Sheffield; Monypenny, Mrs. J. H. G., Sheffield; Moore, J. W., Runcorn.

NAPIER, J. W., Allon; New, Dr. G. F., Billingham; New, Mrs. G. F., Billingham.

O'HARE, T. A., Glasgow; Oliver, J. F., London; Oliver, Mrs. J. F., London.

PARRISH, P., London; Parrish, Mrs. P., London; Peakin, Dr. F. H., Eastham, Cheshire; Peakin, Mrs. F. H., Eastham, Cheshire; Pelle, Ir. J. W., Holland; Pelle, Mevrow J. W., Holland; Perkins, T. R., Manchester; Phillips, Dr. H., Leeds; Pickard, Sir R. H., Wilmslow; Pickard, Lady, Wilmslow; Pierssené, S. H., Leeds; Pooley, H. J., London (General Secretary of the Society); Potter, R. S., Birmingham; Pratt, J. Davidson, London (Hon. Foreign Secretary); Pyman, Dr. F. L., Radcliffe-on-Trent; Pyman, Mrs. F. L., Radcliffe-on-Trent.

RAMSDEN, R. W. L., Birmingham; Ramsden, Mrs. R. W. L., Birmingham; Reavell, E. A., Keston, Kent; Reavell, J. A.,

(*Continued on p.* 283.)

FOR YOUR INFORMATION

OBITUARY

G. Titus Barham, Esq.

Mr. George Titus Barham, of Sudbury Park, Wembley, Middlesex, was born on March 22, 1860, and was the elder of the two surviving sons of the late Sir George Barham, J.P., and Lady Barham, of Danehurst, Hampstead and Snape, Wadhurst, Sussex.

He was educated at University College School, Gower Street, and at the age of eighteen entered the business of the Express Dairy Co., Ltd., which had been founded by his father in 1864. The company was originally started under the name of the Express Country Milk Company, and was afterwards divided into two sections, one being the Dairy Supply Co., Ltd., which took over the wholesale portion and the manufacture of dairy machinery and utensils. The other section, the retail side of the business, was subsequently named the Express Dairy Company, of which Mr. Barham became Managing Director and, on the death of his father in 1913, he succeeded him as Chairman of the Board. Under his control the business expanded to its present great proportions and its employees now number over 10,000.

His services were in much request as a judge of Guernsey and other cattle at the leading agricultural and fat stock shows, including the Royal, the Bath and West, the Royal Counties, the Smithfield Club, and the Dairy Show. Most of the County Shows availed themselves of his services from time to time.

He was one of the oldest members of the Council of the British Dairy Farmers' Association, having been elected in 1882. In 1916 he was elected a Vice-President and on the occasion of the Silver Jubilee of the Association in 1933-1934 he became its President.

Public Work

In the district of Wembley, in which he resided, he was an active supporter of all local movements, and his beautiful grounds at Sudbury Park were frequently thrown open to the public. He was a collector in various directions and his museum at Wembley was probably one of the most extensive and best of its kind in private hands.

He was President of the Wembley Hospital, for the purposes of which he presented 2½ acres of land and liberally subscribed to its funds.

On the incorporation of Wembley as a Borough, he was designated as Charter Mayor and presented the insignia of the office, including the Mace and chains and badges for the Mayor, the Mayoress and the Deputy-Mayor and Mayoress, and the Mayoral and other robes to the Borough, as well as meeting the cost of entertaining a large number of the inhabitants during the celebrations.

Munificent Gift

His estate at Sudbury Park attracted the attention of the local council who desired to preserve it as a public park after his decease and negotiations for an option on its acquisition were entered into. Mr. Barham subsequently intimated his willingness to offer the estate, with its mansion, museum, and buildings as a gift to the locality, subject to a life tenure for himself and wife.

Mr. Barham was a Freemason of many years' standing and was a Past Master and the last of the founders of the Hampstead Lodge.

Despite his years, he was a keen horseman and was a familiar figure in the district when taking his early morning rides preparatory to a long day of close application to the multifarious details of his great business, to which he devoted himself with remarkable vigour to the last.

PFAUDLER HOLD INTERNATIONAL SALES CONFERENCE

E. M. Hallowell, sales manager of Pfaudler Werke, James MacGregor, sales manager of Enamelled Metal Products Corp., and Sidney McCann, director of the same company, are among the executives of the Pfaudler Company's factories who are now in Rochester, U.S.A., for an international sales conference. The visitors will shortly start on an inspection tour of important Pfaudler installations.

Mr. Hallowell is returning shortly to prepare the Pfaudler exhibit at the World's Dairy Congress to be held in Berlin during October.

THE OLD 'UNS HAVE A PARTY

Sir Jeremiah ("Methuselah") Colman

A gathering of worthy centenarians took place at Eastbourne during the month; one of the toasts was "fellow centenarians and other guests". The centenarians, though, were not individuals, but firms.

Hosts were Alfred Bird and Sons, Ltd., celebrating their first century; among their guests were Colman's, Cadbury's, Fry's, and Symington's. Some of the diners were in their second or third "hundreds".

Sir Robert Bird, M.P., told a story of his grandfather who was absent-minded; he used to go to dinners and come home with his pockets full of serviettes.

Sir Jeremiah Colman responded, calling himself "Methuselah of the Methuselahs".

THE SILVERTOWN FIRE

During a recent fire at Silvertown a tank of naphtha overflowed, and blazing molten naphtha spread rapidly, threatening one of London's densest industrial areas. The voluminous clouds of black smoke thrown off by the naphtha hampered the firemen, but eventually the fire was brought under control. Our friends, Silvertown Lubricants, Ltd., told us that although the fire approached their premises to within a few hundred yards, at no time was there cause for real concern as to the safety of their works. The outbreak was discovered at about 6.30 a.m., and the fire raged nearly all the morning.

DUBLIN ROTARIANS VISIT METAL BOX

New buildings which, when completed by the end of 1937, will be the centre of a new light industry for South Wales were inspected by members of the Dublin Rotary Club recently, when they visited the Eaglebush Tinplate Works, Neath, and were addressed by Mr. Douglas Macdonald Hastings, of the Metal Box Co., Ltd., the owners of the works.

The factory, derelict two years ago, is now one of the most efficient in South Wales, producing tinplate of the finest quality made.

Raw tinplate as well as a part of the finished product for which the tinplate was used will be manufactured, while there will be machines lacquering plates and turning out tops and bottoms for fruit, vegetable, and meat cans.

FIVE MILLIONS IN FOOD AND DRINK

The following statistics are taken from the record compiled by Jordan and Sons, Ltd., Company Registration Agents, and show the registration of new companies during the six months January 1 to June 30, 1937.

	Public Companies.		*Private Companies.*	
Class.	*Number Registered.*	*Capital.*	*Number Registered.*	*Capital.*
		£		£
Food	8	760,600	481	1,516,500
Drink	2	1,000,000	46	1,764,417

The total capital invested in the food and drink industry during the first six months of this year is thus £5,041,517.

NEW FOOD FACTORIES AT WELWYN

Industrial development in Welwyn at the present time is extremely active, there are five factories covering nineteen acres in course of construction.

One and a half acres in Bessemer Road is the site of a three-storey factory with a floor area of over 20,000 sq. ft. in course of construction for Atomised Food Products, Ltd.

The Garden City Candy Co., Ltd., a branch of a well-known foreign firm of chocolate manufacturers, are watching the rapid growth of their 25,000 sq. ft. double-storey factory, which will occupy a site of one and a half acres in Broadwater Road when completed.

OCCUPATIONAL DERMATITIS

In every trade where dermatitis or other skin complaints occur by reason of the nature of the work done, it is strongly advisable that precautions be taken against such disease, however slight the risk.

Workers handling flour and sugar, and some fruit, are subject to skin irritation, and "Rozalex", a protective preparation, is specially suitable for use in such cases. "Rozalex" is applied to the hands before work is started, and forms a film which prevents injurious substances from coming into contact with the skin. At the end of the working period soap and water will easily remove the protective film and all dirt and other injurious substances adhering to it; there is no need for drastic abrasives or caustics to be used. This preparation contains no harmful ingredients, and may therefore be used in food factories with perfect safety.

CAUSES OF DERMATITIS

It should be remembered that in many cases dermatitis can be caused, not only by the substances handled during the day's work, but also by spirits, alkalies, caustic soaps, and abrasives used in cleaning the hands at the end of the day. Engineers, for instance, commonly use paraffin for removing dirt and grease; if "Rozalex" is applied at the beginning of the day, ordinary soap and water will remove all this dirt quickly, and there will be no call for other cleansers that are bound, in time, to have serious consequences.

Above is Mr. Samuel Schwarz, who has just completed 25 years with Polak and Schwarz, Ltd. The occasion was duly celebrated at Zaandam, Holland; representatives of associated companies in London, Berlin, New York, Milan and Shanghai were present.

A NEW ONION CONCENTRATE

Food manufacturers have frequently commented upon the difficulty of making dried flavourings mix quickly and smoothly into liquids and semi-liquids. An onion basis recently introduced by McCallum's Special Foods is in paste form, and therefore is eminently suitable for incorporation in foods where onion powders cause trouble.

The onion basis is highly concentrated, and economical in use; it imparts a subtle mellow flavour to food preparations, and mixes quickly without forming lumps.

B.I.F. PASSPORTS

The Department of Overseas Trade announce that free passport visas will be given to foreign buyers visiting next year's British Industries Fair, and also to their wives and children under 18 years of age.

The visas, which can be had on application to the nearest British Consular Officer, are valid for three months from the date of issue.

▼ ▼ ▼

Work is to proceed on erection of new milk products factory at Driffield, Yorks. The cost of the building is estimated at £30,000. The promoters are Glaxo Laboratories, Ltd.

NEW BISCUIT FACTORY FOR NORTHERN IRELAND

"The quantity of biscuits imported into Northern Ireland exceeds one hundred tons per week, and after due consideration I recommended my directors to build and equip a modern biscuit factory, and I am pleased to say they immediately authorised me to proceed." Thus spoke Mr. S. C. Bayne, managing director of Inglis and Co., at the opening of their new biscuit factory at Belfast last month. The Lord Mayor and Lady Mayoress were among the 400 guests present at the opening ceremony.

ENGLISH WHEAT USED

Mr. Bayne told his guests that English wheat—"the best in the world for the production of the best biscuits"—would be used in the factory. The services of Mr. Thomas Piggot, a well-known biscuit expert, had been secured, and it was hoped to do an extensive home and export trade. He wished to pay tribute to the builders, architects, and plant contractors, all of whom had co-operated to erect the fine modern building that was being put into commission.

The flour used by the firm of Inglis cost about £400,000 per annum; they used 600 horses and 160 motor delivery vans to distribute their products, and about 5,000 tons of coal and coke were consumed in a year.

BAKER, PERKINS PLANT

Mr. H. Kermin, a director of Baker, Perkins and Co., who handled the contract for the plant for the new factory, congratulated Inglis and Co. on having set up the new organisation in a remarkably short time. He described the factory as one of the finest biscuit factories that existed, and contrasted its up-to-date plant with the small press used in the first biscuit factory set up in Great Britain 100 years ago.

COLD COMFORT?

During a recent legal action at an Aberdeen police court, an agent made much of the fact that his client was excitable and temperamental.

Sheriff Laing: "What does he do?"

Agent: "He sells ice-cream."

Sheriff Laing: "Then he ought to be able to keep cool."

N. GREENING AND SONS

At the Annual General Meeting of N. Greening and Sons, Ltd., of Warrington, a trading profit of £21,936 13s. 11d. was announced by the directors; this figure was arrived at after the deduction of £3,767 6s. 9d. for depreciation and the crediting of £1,569 19s. 11d. for rents and interest.

The available balance left was £13,315 2s. 1d., and £2,040 10s. was voted for payment of a half-yearly dividend on the Preference shares, and £4,000 in payment of a 4 per cent. dividend on the Ordinary shares. Balance carried forward to the next account was £7,274 12s. 1d.

FOOD PLANT

POWER TRANSMISSION

New Catalogue

Dealing with Power Transmitting Machinery and Appliances giving particulars of Standard Drives in a range of sizes to meet all general industrial requirements, the latest catalogue "Golden Anniversary Edition" (S. 137), issued by Crofts (Engineers), Ltd., is a particularly handy reference book to engineers, designers, draughtsmen, plant managers, and power users in all industries.

There are 21 sections and 426 pages. Complete belt, rope, chain, and gear drives are included, with power outputs, dimensions, illustrations and full details of all products with listed prices in every instance. One of the most comprehensive catalogues we have seen in connection with mechanical power transmission, it is stoutly bound and is provided with a thumb index. Copies can be obtained on application to Messrs. Crofts.

SCREENING

Mr. J. Darnley Taylor, who introduced the Niagra Vibratory Screen to the English market in 1930, has resigned from Niagra Screens (Great Britain), Ltd., Enfield, of which company he was managing director, and will shortly commence a new business in which Screening Cloth will be one speciality.

Mr. Darnley Taylor has devoted much time and thought to the question of wire mesh cloth for vibrating and other types of mechanical screening machines and now claims he can supply material which will give more than double the life of the next best.

His services are also at the disposal of firms seeking advice in screens and screening plant generally; address: 81, Kensington Gardens Square, London, W. 2.

A touch of distinction is given to private offices, board-rooms, and common rooms by the bookcases made by Hathaway, Ltd., of Chippenham, Wilts. Individualistically designed, they are made by local craftsmen, and can be supplied in natural, oiled, or stained finishes.

JOHN THOMSON SHOW WELDED PLANT

Amongst the exhibits on the stand of John Thompson (Dudley), Ltd., of the above, at the Royal Agricultural Show, were the following examples of electrically welded Food Plant from the Dudley branch:

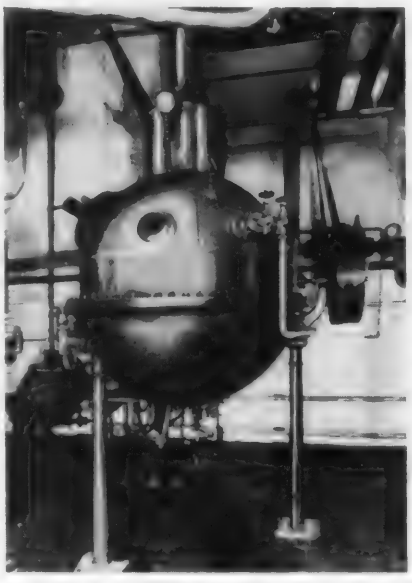
1. Standard Mild Steel Cooking Retort as used in meat canning, ham tinning, and general foodstuffs processing.

2. Standard Hemispherical-bottom Streamlined Jacketed Cooking Pan with stainless steel inner pan. This equipment is alternatively supplied with inner pan in Nickel, Monel, or Inconel.

3. Mild Steel Mixer, homogeneously lead lined and fitted with motor reduction gear driving a Typhoon agitator, the latter being of welded construction made from Everdur non-ferrous acid-resisting material.

This latter item is of special interest, representing as it does the pioneer work of John Thompson's in the successful welding of this recently developed alloy.

MARMITE ADOPT INCONEL



This picture shows a specially designed spherical pan at the Marmite factory. The pan is used for treating the final liquor *in vacuo*; Inconel was the alloy chosen for the pan because of its resistance to corrosion.

BROOM AND WADE NEW LOW-POWERED AIR MOTORS

For the driving of small machines, Broom and Wade, Ltd., have introduced a series of rotary compressed air motors with outputs from ½ brake horse-power at 1,500 r.p.m., to 5 brake horse-power at 2,500 r.p.m., with a pressure of 80 lb. per square inch.

The main feature of the design is a stainless-steel rotor which is supported in ball and roller bearings and is provided with four non-metallic blades. The speed of the motor is controlled by an automatic centrifugal governor which operates in conjunction with the air-inlet throttle valve and ensures the most economical air consumption at all speeds and loads. It is claimed that these motors are lighter and more compact than any other type of power unit and, being entirely free from reciprocating parts liable to wear, are reliable and cheap to maintain.

★ STARS AND STRIPES DEPARTMENT ★

Some of this month's items from America

SHAVES, NOT SHECKELS, BOUGHT HIS REFRIGERATOR

America, the Land of Bright Ideas, has reverted to primitive methods of barter. The selling of refrigerators is notoriously a job for the super-salesman; one such bright lad in Dubuque, Iowa, recently sold a refrigerator to a barber in the town. As often happens, when the time came to pay, the poor barber wondered why on earth he had consented to buy the refrigerator, and wondered still more how he was going to pay for it.

Happily, the resourceful salesman hit on a solution. The barber should pay for his refrigerator, not in sheckels but in shaves.

Accordingly, Mr. Appel, head of the firm that sold the refrigerator, agreed to be shaved and have his hair cut regularly by the impecunious barber until the debt was settled. The only snag was that Mr. Appel has a growing tendency to baldness, and he was afraid that it would take a long time to work off the payments as regards haircuts. So an edict went forth that all the Appel family, all his partner's family, and all the Appel sales force were to have their shaves and haircuts at the barber's shop. They did—and have just completed two hundred dollars' worth. The refrigerator is paid for, and the barber is happy. The only thing we are wondering is —was the salesman's commission paid in razor blades.

MATTER OF TASTE

A Californian fruit canning factory is producing large quantities of beer from prunes, the taste of which, according to those who like it, is said to be something between stout and syrup of figs. It is not reported what the others said.

"OPENING UP" COCOA BEANS

If cocoa beans are reduced in size to coarse grained pieces, and then soaked in solutions of fructose, grape sugar or caramelised sugar, chemical changes will cause the "opening up" of the beans, in such a way that after roasting, it is remarkably easy to remove the oil, Albert Diefenbach asserts in U.S. Patent 2,064,524.

The inventor claims that his method avoids the development of unpleasant odours and changes in taste, produced by the use of steam or alkaline to "open up" the bean.

DEADLOCK

Labour unrest in the U.S.A. has had disturbing effects on industry, and food manufacturers have suffered with other sections of American trade. The big plant of the Morgan Packing Company at Austin, Indiana, was closed recently by a strike. In fact, our esteemed contemporary, *Food Industries*, picturesquely describes the factory as being "tied up tighter than the neckband on a bargain shirt."

CIDER and FRUIT JUICE ANALYSIS*

CIDERS examined for any reason whatever are analysed for specific gravity (using an ordinary hydrometer), malic acid acidity (titration of cider freed from CO_2 with 0·7 soda) and "tannin." This last constituent is of great importance from an organoleptic point of view, as it confers astringency and "body" on the beverage. The method in use at Long Ashton is that of Löwenthal and involves the titration of the cider (1 c.c. in 300 c.c. water) with 0·0785 per cent. permanganate solution, using standardised indigo carmine as an external indicator, and it has been amply proved that the permanganate-reducing figure can be correlated with exactitude with the astringent taste of the cider.

Alcohol is determined by distilling off 80 c.c. distillate from 100 c.c. cider. The cider is generally first neutralised and rendered just alkaline before distillation. The distillate is brought to correct temperature, bulked, and the density determined with a specific gravity bottle. The alcohol content is obtained by reference to the appropriate tables.

In determining the content of sugar, the cider is cleared with lead acetate, excess of lead immediately removed with potassium oxalate and the reducing sugars determined by the Lane and Eynon method. An aliquot of the cleared solution is inverted with citric acid for 15 minutes by boiling under a reflux condenser. The inverted sugar solution is then neutralised and titrated with Felling's solution by the same method. Inversion of sucrose by natural means is usually complete after the first fortnight of fermentation in the fresh juice, and consequently fully fermented ciders do not generally contain any sucrose.

All the determinations described above for cider products are in constant use for fruit juices in general. For ascorbic acid fruit juices can be titrated directly with Tillman's indicator, 2:6 dichloro-phenol-indophenol, provided that no preservatives or colouring matters have been added. The determination is carried out in acetic acid solution and offers no complications. Last summer the first series of experiments on fresh fruit juices from different varieties of soft fruits were carried out at Long Ashton, and indicated that fresh black currant juice contained more than twice the amount of ascorbic acid usually present in lemon or orange juice, while the juice of strawberries equalled the citrus juices in content of this accessory food factor.

The total SO_2 in fruit syrups is determined by the usual Monier-Williams method. An adaptation of this method has been evolved to determine the "free" SO_2 in fruit syrups. The *p*H of the material before distillation is adjusted to 3·5 and the SO_2 distilled off (without the addition of acid) at 50° C. in a vacuum produced and maintained by an ordinary water pump. The determination of "free" SO_2 in syrups is of the utmost importance. The suppression of yeasts is effected solely by this form of SO_2, and fixation of SO_2 by sugar and aldehyde compounds occurs to varying extents in sugar syrups.

* Vernon L. S. Charley, B.Sc., *The Chemical Age*, April 24, 1937.

ISOLATING and MEASURING DIRT in MILK

THE report of the sub-committee* of the Society of Public Analysts on dirt in milk covers the designation of the term "dirt", the method of ascertaining its type and origin, and gives a quantitative method of determination and impression. The particulate matter suspended in fresh milk tends to fall when the milk is at rest. However, a fraction, which may amount to 30 per cent. of the total, is entangled with the fat globules and may rise with the cream. It is proved that the whole of suspended matters in fresh milk can be obtained as a sediment if the milk is intermittently stirred during a sufficiently long period—a minimum of 72 hours is established.

The method is carried out by means of standard sedimentation and centrifuge tubes, the dimensions of which are given in British Standard Specification No. 736, 1937. To a known amount of the sample is added a given amount of formaldehyde or potassium dichromate solution, and the liquids then stand, with stirring every four hours, for the minimum period of 72 hours. It is then subsequently spun in the centrifuge for 3 minutes at 2,000 r.p.m. After decantation by the means outlined, the sediment is subsequently treated with ammonia and centrifuged. The dirt, after washing, is treated similarly with hydrochloric acid and washed, after being spun. The treatments with ammonia, water, hydrochloric acid and water again are repeated, and the dirt finally washed free from chlorides.

In order to measure the dirt, the tube containing it is further centrifuged, the surface of the deposit levelled off, and is further spun in the centrifuge for 5 minutes at not less than 2,000 r.p.m. The dirt is now found as a compact mass at the bottom of the tube, and may be measured. The sub-committee considers that clean milk contains less than 1 part by volume of moist dirt in 100,000 parts by volume of milk, and that a limit of 2 parts per 100,000 is the maximum to be conceded. This does not imply that milk containing less than 2 parts of dirt is clean milk. They do not recommend legal action, in the case of an isolated sample of dirty milk, unless the amount exceeds 3 parts by volume in 100,000 parts of the sample.

* *Analyst*, 1937, **62**, 287.

FREEZING POULTRY from INSIDE

THE "Cridericed" process of freezing poultry, by reversing the procedure customarily followed in other food-freezing systems, is the subject of U.S. Patent No. 1,797,606, described in *Food Industries*, May, 1937. The Crider system is that of having the freezing action proceed from inside instead of from outside. This is accomplished by circulating the refrigerant through paraffined paper tubes inserted through the object, and is particularly applicable to poultry.

After the tube has been inserted, the cleaned and washed giblets, the bony part of the neck from which the head has been cut, and a small quantity of water are placed in the cavity of the fowl surrounding the tube. The filling of this cavity serves to transmit the freezing temperature to the body of the fowl. The freezing operation is carried out in a room held at approximately 32° F. Brine of a salometer density of 86·8 at 59° F., which corresponds to 23 per cent sodium chloride by weight, is run through the equipment at −3° to −5° F. Time of freezing varies according to the size of the bird, and is from 15 to 18 minutes for boilers of about 1½ lb. weight, to 30-35 minutes for a 4-lb. bird.

Members and Guests at Food Group Meeting

(*Continued from p. 277.*)

London; Rendle, T., Cambridge; Rendle, Mrs. T., Cambridge; Richardson, E. F., Coulsdon; Roberts, Dr. A. L., Leeds (Hon. Secretary, Executive Committee, Yorkshire Section); Robinson, Miss R., Manchester; Robson, S., Bristol; Robson, Mrs. S., Bristol; Rodd, Dr. E. H., Manchester; Rodd, Mrs. E. H., Manchester; Ronald, V. R., London; Ronald, Mrs. V. R., London; Rose, J. L., Westcliffe, Essex; Rosling, Miss E. M., Leeds; Rowe, Prof. F. M., Leeds; Rowell, H. W., Birmingham; Rowell, Mrs. H. W., Birmingham; Russell, Miss, Manchester; Russell, W., London.

SIMPSON, J., Glasgow; Simpson, Mrs. J., Glasgow; Sims, H. H., Morecambe; Skilling, W. J., Glasgow; Skilling, Mrs. W. J., Glasgow; Skirrow, Dr. F. W., Purley; Smith, Dr. T. A., Derby; Smith, Mrs. T. A., Derby; Sproxton, F., Colchester; Sproxton, Mrs. F., Colchester; Stevens, F. W., Leicester; Stevens, Mrs. F. W., Leicester; Stewart, Mrs. H. F., London; Sutherland, J., Luton; Sutherland, Miss J. A., Luton; Sutton, Miss L. M., Leeds.

TAINSH, P. W., Port Sunlight; Tew, Mrs. M., London; Thomas, F. E., Manchester; Thomas, Mrs. F. E., Manchester; Thomas, Dr. R., Bromborough; Thomas, Mrs. R., Bromborough; Thompson, Edwin, Liverpool; Thompson, Mrs. E., Liverpool; Thompson, J. T., Leeds; Towers, J. S., Liverpool.

VENN, R. J., Colchester; Vickers, Dr. A. E. J., Norton-on-Tees; Vickers, Mrs. A. E. J., Norton-on-Tees.

WALKER, E. E., Eccles; Weber, I. E., Luton; Weber, Mrs. I. E., Luton; Webster, A., Parkstone; Webster, Mrs. A., Parkstone; Welch, W., Huddersfield; Welch, Mrs. W., Huddersfield; deWhalley, H. C. S., Farnborough; deWhalley, Mrs. H. C. S., Farnborough; Whitehead, A., Manchester; Whitelegg, C. J., Styal; Whitelock, E. D., Leeds; Whitelock, Mrs. E. D., Leeds; Whittaker, C. M., Stockport; Whittaker, Mrs. C. M., Stockport; Willey, W. Lloyd, London; Willey, Mrs. Lloyd, London; Willey, Miss Lloyd, London; Williams, R., Lancaster; Wilsdon, B. H., Leeds; Wilsdon, Mrs. B. H., Leeds; Wilson, Miss P. M. C., Leeds; Wilson, Prof. F. J., Glasgow; Winter, R. M., Frodsham; Winter, Mrs. R. M., Frodsham; Wiseman, C. E., Maidstone; Wiseman, Mrs. C. E., Maidstone; Wishart, J. M., Shipley; Wishart, Mrs. J. M., Shipley; Wood, Dr. F. C., Manchester; Wood, Mrs. F. C., Manchester; Woodhouse, W., Beeston; Woodmansey, A., Harrogate; Woodmansey, Mrs. A., Harrogate; Wright, C. H., Leeds.

AIR CONDITIONING AT LJUNGSBRO

(From a Correspondent)

ONE of the requirements for obtaining perfect food products is the control of the plant in which they are produced and of the conditions in the plant. This is particularly true of chocolates and sweets. These require conditions of temperature and humidity which determine whether the product is to be first class or merely ordinary.

One of the most efficient installations on the Continent is that of the Swedish Cloetta firm at Ljungsbro, in which the greatest care has been taken in the arrangement of automatic controls, which are built so that all the conditions can be controlled and watched from a single point.

The most important is the installation of air conditioning which, although the plant is built in a region where the air is naturally pure, was considered necessary. The conditions of freedom from dust, temperature and humidity are controlled carefully by some ten separate plants, each serving a group of shops.

The system used is to filter the air on oil filters. These consist of a series of corrugated sheet metal, covered with a thin layer of oil. The air, on passing through the narrow spaces between the sheets leaves all the solid matter on the oil coating. The cooling of the air permits at the same time the removal of excess moisture, and is carried on in cells consisting of alternate brine and air circulations. In winter the brine is replaced by hot water. This air is forced by fans into the shops, which are thus kept supplied with air of the same temperature and characteristics of humidity all the year round.

The operation of the plant is completely automatic and is sufficiently accurate that the variations in temperature are less than 1° F. the year round, while the variation in humidity is never more than 1° F.

CHEMICAL COMPOSITION of EEL OIL

A SAMPLE of liver oil from a specimen of New Zealand eel, *Anguilla auklandii*, weighing 20 lb., has been examined by the methods of Hilditch and co-workers. It possessed the following characteristics: Saponification equivalent, 290; iodine value, 122; unsaponifiable matter, 0·8 per cent. By oxidation first with alkaline permanganate and later by bromine, the composition of the component fatty acids was found to resemble very closely that obtained by Lovern for typical fresh-water fish, both in unsaturated and saturated acids of the C_{14}, C_{16} . . . C_{22} series. Fractionation of the unsaturated C_{18} acids, by bromination of their redistilled ethyl esters, yielded an ether-insoluble bromide of high melting point indicative of stearidonic (octadecatetraenoic) acid, in addition to oleic acid. Linoleic and linolenic acids were not found. The polyethenoid C_{18} acids of eel oil resemble, therefore, those found in cod liver and whale oils.—*Biochem. J.*, 1936, **30**, 1775; through *Quart. J. Pharmacol.*

Letters

Nitrite in Cured Meat

To the Editor, FOOD MANUFACTURE.

DEAR SIR,—I was extremely surprised to read the categorical statement at the commencement of the above article in the July issue of FOOD MANUFACTURE to the effect that the use of nitrite is prohibited in this country. I have asked several times and am still asking, if your special correspondent can inform me by what authority this opinion is formed. To me it is extremely interesting that immediately above this statement the remark is made that nitrite is produced from nitrate by bacterial action. There seems to be a general belief that the use of nitrite is prohibited by the Preservatives, etc., in Food Regulations, but I have re-read these Regulations numbers of times without seeing the slightest reference to nitrite in them. The amount of nitrite required to produce a certain colour in meat is less than the amount of nitrite which may be produced by the action of bacteria in the cure, therefore, *ipso facto*, the amount of nitrite which is added to produce a certain colour in meat is not a preservative. In that case it may be asked what is nitrite added for, and my immediate reply is that it is added solely to give the meat a colour and, as such, is certainly not prohibited by the Regulations. It is perhaps unfortunate that Ministers in this country have power to make Orders, but not to interpret them, and consequently as the Minister of Health has not seen fit to mention in the Order whether nitrite is a preservative or a colour, the point can only be cleared up by some authority or person taking a case to the courts. The situation is all the more ridiculous because one hears a persistent rumour to the effect that one of the most popular brands of imported corned beef is cured by the hot-cure process with nitrite, and also that certain meat packers in this country make use of small quantities of nitrite. Assuming for one instant that it is illegal to employ nitrite in this country, I should like to ask those who uphold this view how they are to distinguish between nitrite and nitrate cured meat. If they are unable to do so, then, by checking up the consumption of nitrite in this country, it may be possible to prevent its use for meat curing in this country. So far, so good, but what about imported meat, which really forms the bulk of the canned meat in this country? How are we going to find out the process by which it has been cured? and if we cannot, then I submit that we are placing an embargo on the British packer to the advantage of his foreign competitor if any attempt is to be made to prohibit its use in this country.

Now I should like to mention one important reason why I, for one, would encourage the use of nitrite-cured meat in place of the nitrate-cured product. The tendency to can larger and larger joints is growing and everyone knows that it is impossible to sterilise canned gammons properly, for the simple reason that there are at least three distinct spore-forming anaerobic bacteria which play a part in the cold-curing of meat, and these spores are not destroyed when large cans of meat are put through a sterilising process after being filled. Every packer of these products is content to allow a large wastage, but where does the borderline exist between the safe and the unsafe product, and may not these anaerobic bacteria have some influence on the bacterial flora of the human intestine? Is there not a possibility, sir, that, in our efforts to be extremely correct, we may strain at a gnat and swallow a camel?

Yours faithfully,
THOMAS MCLACHLAN.

EDITOR'S NOTE.—*Obviously, as the use of nitrite is permitted in the U.S.A., any cured meats imported from there may be expected to be nitrite-cured.*

Copper in Tomato Purée

To the Editor, FOOD MANUFACTURE.

SIR,—I am grateful to your correspondent for his letter with reference to the above, but I do suggest, sir, that he begs the point in maintaining that a reasonable limit for the amount of copper in *purée* should be 25 parts per million. If I interpret his reasoning correctly, then the logic which I was taught at school was incorrect. If a man is hanged he dies, but it does not necessarily follow that if he dies he is hanged, yet your correspondent wishes us to assume that because a tomato may possibly contain 5 parts of copper per million, then we must admit of the possibility of all tomatoes containing 5 parts of copper per million, although he admits that he has never found more than 2 parts per million himself and quotes another authority who has found up to 0·6 parts per million.

In the administration of the law we are not concerned with the consideration of what may or may not be a toxic amount of any poison in a food, we are only concerned with what may reasonably be expected to gain access to a food, provided that reasonable precautions are taken during manufacture. Does your correspondent feel that we should assume that all tomatoes are therefore to contain 5 parts of copper per million and that copper pans are the correct metal in which they should be processed? Otherwise I still fail to see how he obtains his 25 parts per million for ordinary *purée*.

I am, sir, yours faithfully,
PUBLIC ANALYST.

Wetting and Detergency

This volume collects all the papers read and the main discussions contributed at the Third Symposium organised by the British Section of the International Society of Leather Trades Chemists. A thorough examination of the physico-chemical principles underlying wetting is provided, and the twenty papers cover ground of interest to practically every branch of industry. As Dr. Clayton comments in his foreword, wetting problems abound in so diverse directions as textiles, hides, skins, leather, paints, varnishes, insecticides, fungicides, flotation, solders, metal coatings, and many others.

Particularly interesting to chemists is the paper by H. Martin on Detergents and Wetting-out Agents as Assistants in Plant Pest Control, which deals with the practical aspects concerning the functions of spray fluids, assessment of wetting, spreading, and penetration properties, etc. Conmar Robinson contributes on the Mechanism of Detergent Action. Other and excellent papers deal with solvent action, the action of new detergents, and the solubility of organic substances in aqueous soap solutions. The papers reflect the theoretical and practical advances made, and the manner of utilising the newer knowledge. This is a volume for the individual as well as the library shelf.

J. P. L.

Wetting and Detergency. Med. 8vo. 56 figs. 15s. net: post 6d.

Nitrogen Trichloride in the Fruit Industry

NITROGEN trichloride is now in use commercially in California for the prevention of decay in citrus fruit. The gas kills the spores on the surface of the fruit, but does not destroy the mycelium after it has once penetrated into the inner portions. It will penetrate the wrappers of a packed box of fruit. Apparatus for the safe production of the gas in dilute concentration in air and for its application within storage rooms and refrigerator cars has been developed.—*Chemical Trade Journal.*

INFORMATION and ADVICE

Analysis of Baked Wheaten Flour—Pineapple Marmalade—Syrup for cooking Puffed Corn—Orange Cheese—Anti-Frothing Edible Oil—Lemon Curd—White Sausage Rusk and Binder—Effervescent Lemonade Powder

Analysis of Baked Wheaten Flour

2,153. *Can you give me the analysis of the average sample of baked wheaten flour? Is there any literature on this subject?* (Lincolnshire.)

You will find comprehensive tables of analytical data relating to all the constituents of flour in *The Technology of Breadmaking*, by W. Jago. The tables are on pages 561, 562, and 563. We would recommend you to consult this work, copies of which can be obtained via this office if desired.

Pineapple Marmalade

2,154. *Will you please give me a formula for making pineapple marmalade?* (India.)

A typical recipe for pineapple marmalade is:

Grated pineapple	28 lb.
White sugar	60 ,,
Liquid pectin	4 ,,
Water	2 gal.
Tartaric acid	1 oz.
A little yellow colour.	

Put sugar and water into a steam-pan, add the acid and bring to boil. All the pineapple, and gently bring to boil, stirring well, at 220° F.

Now add the pectin and colour, and bring up to 222·5° F. Turn off steam, pour into a hand-pan, cool to 220° F. and pour into jars, which should be perfectly dry.

Syrup for cooking Puffed Corn

2,155. *Will you please give me the formula and process for the preparation of a syrup in which to cook puffed corn for the making of corn biscuits?* (South India.)

A method is here given which should prove suitable to your requirements:

White sugar	20 lb.
Cream of tartar	1½ oz.
Water	1 gal.

Place sugar, water, and cream of tartar into a steam-pan, stir well, turn on steam gently, and bring to the boil in not less than 6 minutes, stirring all the time. Turn off steam. Pour a little syrup into a glass jar and hold it to the light to see if the sugar is inverted. No crystals should be seen. If not inverted, add another ½ gal. of water and bring to boil again. The sugar *must* be inverted. Turn on steam and bring up to 260° F. Dip a few corns in and see if they turn brown enough. If not, bring syrup up to 270° F. or more until syrup is hot enough. All depends on the heat of the syrup for colour and flavour. The corn should be dipped in the syrup in a fine wire basket. When browned sufficiently, lift out the basket and drain. Then throw out on to greaseproof paper to cool.

Orange Cheese

2,156. *We will be very glad to obtain information on how to make Orange Cheese.* (Palestine.)

A typical formula is given below:

Oranges	28 lb.
White sugar	50 ,,
Water	4 gal.

Procedure.—Scrub the oranges clean in hot water. Cut up the peel fine and put into a steam-pan with about 6 gal. of water and simmer until quite soft. Then rub it through a fine sieve to form a pulp. Now put the inside of the oranges into a steam-pan and just cover with water. Gently simmer for 5 to 6 minutes, then rub through a sieve (mesh 8 to the inch). Put the 4 gal. of water into a steam-pan and bring to the boil. Add the sugar. Stir well, and keep boiling to 220° F. Then add the pulp from peel and oranges. Boil up to 223° F., well skimming all the time. Pour into a hand-pan and fill.

Anti-Frothing Edible Oil

2,157. *In the April issue of* FOOD MANUFACTURE *an article on Tomato Purée mentioned that frothing may be overcome by the use of edible nut oil. Can you tell us what oil is recommended?* (Channel Islands.)

Probably the best oil to use is ground nut oil (Arachis oil), but Continental manufacturers often use other oils, such as olive oil or refined cotton-seed oil. The usual amount required to overcome excessive frothing is about 1 pint per 3,000 gal. The main trouble, of course, occurs in the initial stages of evaporation, and once the process has been started and a continuous inflow of raw juice into the evaporator is maintained, excessive frothing does not usually occur.

Lemon Curd

2,158. *Could you let us have a formula for a Lemon Curd and the process for making?* (Nottingham.)

A typical formula for Lemon Curd is given which will serve as a basis for experimentation:

Sugar	60 lb.
Glucose	12 ,,
Margarine	4 ,,
Eggs	½ doz.
Lemon juice	1 gal.
Essence of lemon	2½ oz.

Wheat flour	6 lb.
Corn flour	6 ,,
Water	5½ gal.
Colour as desired.	

Make the flour into paste with 2½ gal. of cold water and stand overnight. Add the sugar and glucose to rest of water in jar. Boil to 245° F. and cut off steam. Mix in the margarine. Add the eggs, previously whisked. Add the flour paste and stir well. Add the lemon juice. Gently raise to 180° F. and gently simmer for 15 minutes.

From this formula you will observe that nothing elaborate is required in the way of utensils, the size of which depends upon the quantities made.

White Sausage Rusk and Binder

2,159. *Can you supply me with data how to produce white sausage rusk and binder? We have tried dough made with baking powder, also with ammonium bicarbonate, but it loses colour on drying.* (Leeds.)

It is suggested that as you are already baking bread it would probably be better to utilise bread. A flour with a low gluten content should be used, and the yeast reduced to a minimum. No sugar should be included in the mix. This bread could be used in a dry state, or it could be sliced and passed through a crushing machine to form a bread rusk.

Your formula appears to be too alkaline, and that probably accounts for the yellow-brown colour which always results from over alkalining. It is suggested the ammonium bicarbonate be omitted altogether. A raising agent, given below, could be used:

Cream of tartar	6 lb.
Bicarbonate of soda	3 ,,
Per sack of 280 lb. flour.	

Effervescent Lemonade Powder

2,568. *Could you suggest a formula for an effervescent lemonade powder?* (Aberdeen.)

When all ingredients are composed of sodium bicarbonate and an acid, the acids are selected from the following:

Citric acid, tartaric acid, cream of tartar, sodium pyrophosphate, and calcium acid phosphate. Each of the above-mentioned acids behaves differently in combination with sodium bicarbonate. Tartaric acid and citric acid act very rapidly on the sodium bicarbonate in the production of gas. These acids also store badly in contact with sodium bicarbonate and deteriorate rapidly. Calcium acid phosphate and cream of tartar are less vigorous and produce a slower effervescence, but they store much better when made up. Sodium pyrophosphate is less vigorous still, but keeps almost indefinitely in mixtures. Calcium acid phosphate is apt to produce cloudiness.

It is usual to make up a combination containing at least two acid ingredients, such as:

Tartaric acid, 1 part.
Cream of tartar, 1 part.
Sodium bicarbonate, 2 parts.

A proportion of this mixture is then added to the lemonade powder. Sodium pyrophosphate (trade name "Crephos") may be advantageously substituted for the above-mentioned cream of tartar, and a better keeping is thereby produced.

The proportion of added effervescing mixture will depend on the result required, and usually 1 lb. per cwt. of lemonade crystals is sufficient.

A typical recipe for effervescing lemonade powder is as follows:

Sugar, 56 lb.
Citric or tartaric acid, 2½ lb.
Terpene essence lemon, 3 drm.
Colour, 2 oz. of 10 per cent. solution.
Effervescing mixture, 6 oz.

Materials and Equipment Required

We have received enquiries concerning the suppliers of the following equipment and materials, and suitable recommendations have been made.

2,557. *Machines for plucking fowls. Machines for filling paste.* (Russia.)

2,580. *Plant for manufacture of coffee essence.* (Siam.)

2,165. *Firm where the Jelmeter may be obtained in England.* (Bristol.)

2,517. (1) *Machine for making up synthetic cream.* (Liverpool.)

(2) *Could you give us a standard mixing for reconstituted cream?*

We provide two formulas.

1. (35 per cent. butter fat): water, 4¼ pints; unsalted butter, 68 oz.; skim milk powder, 10 oz.

2. (40 per cent. butter fat): water, 3¾ pints; unsalted butter, 77 oz.; skim milk powder, 9 oz.

It is important that the finest unsalted butter be used. Cream reconstituted by a homogeniser will not whip.

(3) *Information as to the manufacture of filling cream.*

Filling cream (fondant); stock fondant, hand-made; 89 lb. sugar; 11 lb. glucose.

Dissolve the sugar carefully, using about 1 lb. water to 3 lb. sugar. Add the glucose and boil as quickly as possible to 242° F., taking care to keep the pan free from deposit of sugar. Pour out on to a cooling plate with the minimum of disturbance and when cool (85° to 90° F.), wet the surface slightly and beat thoroughly with a wooden spatula until a creamy mass is obtained. Stock in tins covered with a damp cloth or a film of sugar syrup until required. It is improved by standing twenty-four hours. Variations of the formula can be obtained from *Sweet Manufacture*, by F. N. Scarborough, at this office.

2,186. *Plant for manufacture of Farina and Dextrin.* (New Zealand.)

2,601. *Manufacture of Drinking Fountains for factory purposes.* (Dublin.)

2,631. *Automatic machines for buttering bread.* (Cardiff.)

2,651. *Machines for preserving foodstuffs.* (Beyrouth.)

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NEW COMPANIES

Amalgamated Dairies, Limited. (F.3451.) Incorporated in New Zealand in December, 1936. 26, Tooley Street, S.E. 1. Formed to take over the undertaking of Amalgamated Dairies, Ltd. Nom. Cap.: £70,000. Name of person authorised to accept service: J. B. White, 26, Tooley Street, S.E. 1.

Anglo-Danish Casein Company, Limited. (329,052.) To carry on bus. as mnfrs. and finishers of articles and substances manufactured from casein or other products of milk, etc. Nom. Cap.: £6,450.

Bacons Stores (Parkstone), Limited. (329,149.) 81, Bournemouth Road, Parkstone, Dorset. To carry on the bus. of grocers, provision mchts., etc. Nom. Cap.: £2,000. Dirs.: E. H. W. Bacon, Brynawelon, Frankland Crescent, Parkstone; Ada M. H. Bacon, Brynawelon, Frankland Crescent, Parkstone; F. A. Butler, 36, North Lodge Road, Branksome, Bournemouth; Gwendolen A. Bacon, Brynawelon, Frankland Crescent, Parkstone.

Britannia Mill Company (Liverpool), Limited. (329,182.) To take over the mnfg. confectionery bus. cd. on as the Britannia Mill Co. Nom. Cap.: £2,000. Qual. of dirs.: £1.

H. Calam, Limited. (329,237.) To carry on the bus. of bakers, pastrycooks, etc. Nom. Cap.: £1,000. Dirs.: H. Calam, 49, Ashbrow Road, Fartown, Huddersfield; S. Calam, 47, Adelphi Road, Marsh, Huddersfield; G. Calam, 44, Central Avenue, Fartown, Huddersfield.

Cathcart Animal Products, Limited. (328,482.) 27-29, Princes Street, Liverpool. To carry on the bus. of mnfrs. of and dlrs. in sausage casings, etc. Nom. Cap.: £5,000. Dirs.: J. W. Hislop, Courland, Prenton Lane, Birkenhead (permt. ch.); J. P. Hislop, Courland, Prenton Lane, Birkenhead; F. W. Hislop, Courland, Prenton Lane, Birkenhead.

City Dairy (Blackburn), Limited. (328,483.) To take over the bus. of dairymen, etc., cd. on by A., W. P., T. and J. Walne as the City Dairy, at Princes Street, Blackburn. Nom. Cap.: £10,000. Dirs.: T. Walne, 89, Langham Road, Blackburn; J. Walne, 481, Revidge Road, Blackburn.

F. J. Clark, Limited. (329,271.) 31, High Street, Crayford, Kent. To carry on the bus. of provision mchts., grocers, etc. Nom. Cap.: £1,500. Dirs.: F. J. Clark, 31, High Street, Crayford, Kent (permt.); Mrs. A. A. M. Clark, 31, High Street, Crayford, Kent.

Cullen's (Abingdon), Limited. (328,610.) 11 and 13, Stert Street, Abingdon. To carry on bus. as grocers and general storekeepers, etc. Nom. Cap.: £15,000. Dirs.: S. Cullen, Victoria Lodge, Abingdon; Miss M. Cullen, Milton, Berks.

Devon and Cornwall Hotels, Limited. (328,611.) To take over the bus. of hotel proprietors cd. on at the St. Elmo Hotel, Salcombe, Devon. Nom. Cap.: £7,000. Dirs.: C. S. Saxton, St. Davids, Morwenstow, near Bude; W. V. Peek, Whitesand Bay Hotel, Sennen, Cornwall; Gwendolen S. Saxton, address not stated; Muriel J. R. Peek, address not stated. (Two first named are permanent.)

J. V. Franklin, Limited. (329,039.) 214, Washwood Heath Road, Birmingham. To carry on the bus. of bakers, confectioners, etc. Nom. Cap.: £1,500 in £1 shares. Dirs.: J. V. Franklin, 214, Washwood Heath Road, Birmingham (permt.); T. R. Franklin, 63, Foley Road, Ward End, Birmingham; Susan E. Franklin, 214, Washwood Heath Road, Birmingham.

German Wine Growers, Limited. (329,370.) To carry on bus. as importers, exporters and growers of and dlrs. in wines, beers, spirits, etc. Nom. Cap.: £5,000.

John E. Goodwin (Hereford), Limited. (328,381.) To take over the bus. of fruitgrowers, preservers and canners cd. on at Huntingdon, Hereford, as "John E. Goodwin". Nom. Cap.: £10,000. Dirs.: J. E. Goodwin, Huntingdon, Hereford; Miss M. Birchley, Llanwarne Court, Herefordshire.

W. J. Hatt, Limited. (328,277.) 8, St. Mary's Street, Wallingford, Berks. To carry on the bus. of dairy and general farmers, etc. Nom. Cap.: £3,000. Dirs.: W. J. Hatt, Bottom Farm, Checkendon, Reading; Mrs. E. F. Hatt, Bottom Farm, Checkendon, Reading.

Thos. Hemmant, Limited. (329,174.) 104, Main Street, Bingley, Yorks. To take over the bus. of a grocer and provision mcht. cd. on at Bingley, Yorks, as "Thomas Hemmant". Nom. Cap.: £1,000. Permt. dirs.: T. Hemmant, Heathcliffe, Crow Nest Road, Bingley; Winifred Hemmant, Heathcliffe, Crow Nest Road, Bingley.

International Tea Market Expansion Board, Limited. (328,300.) Plantation House, Fenchurch Street, E.C. 3. To study ways for increasing the consumption of tea, and to carry on propaganda work, etc. Dirs.: Sir Alfred Pickford, Oriental Club, Hanover Square, W. 1; E. R. Colman, 3, Whitehall Court, S.W. 1; Sir Theodore Chambers, K.B.E., 12, Hyde Park Place, W. 2; W. Coombe, Dornden, Tunbridge Wells.

Johnny's, Limited. (329,243.) To carry on the bus. of dlrs. in wine, spirits, beer, mineral waters, etc. Nom. Cap.: £3,000. Dirs.: A. B. Bithell, Golden Ball Hotel, Poulton le Fylde, Lancs; B. Nabb, Stockdove, Wood, Cleveleys, Blackpool.

Lawrance and Powell, Limited. (329,083.) 434, Green Lanes, Palmer's Green, N. 13. To carry on bus. as grocers, bakers, confectioners, etc. Nom. Cap.: £1,000 in £1 shares (750 ord. and 250 "B" employees). Dirs.: T. Powell, 83, Woodland Way, N. 21; Mrs. I. Powell, 83, Woodland Way, N. 21.

Lebus (London), Limited. (329,357.) 94, Old Broad Street, E.C. 2. To carry on the bus. of bakers, confectioners, etc. Nom. Cap.: £1,000. Dirs.: A. G. A. Rainey, Thrapston, 19, Monkhams Drive, Woodford Green, Essex; A. H. Lawrence, 8, Ullathorne Road, S.W. 16.

Lion Hotel (Tenby), Limited. (328,493.) To take over the bus. of hotel proprietors cd. on at the Royal Lion Hotel, Tenby, Pembrokeshire. Nom. Cap.: £10,000.

Merseyside Food Products, Limited. (328,536.) To carry on the bus. of mnfrs. of margarine, cooking fats, food products, etc. Nom. Cap.: £6,000.

R. J. Mitchell and Son, Limited. (328,313.) To carry on the bus. of millers, corn and seed mchts., etc. Nom. Cap.: £10,000.

National Dairymen's Association (Incorporated). (328,538.) To acquire the surplus assets of the National Federation of Dairymen's Association (Incorporated), etc. Council: R. J. Parsons, Bingley Moors, Queen's Park, Bournemouth (President); W. W. Walker, Nsynbornewyll, Croesyceiliog, Mon. (Vice-President); R. Steel, 77, Grove Road, Woodford, E. 18; F. Smith, Knighton Grange, Leicester; E. R. Harris, Dry Hill Farm Dairy, Tonbridge, Kent; J. Smith, 13, Hall Road, Norwich; and eight others.

Pascall Food Products, Limited. (328,540.) Room 30, Duke Street House, Duke Street, Oxford Street, W. To carry on the bus. of mnfrs. of and dlrs. in orange and lemon pulp, fruit essences, syrups, etc. Nom. Cap.: £600. Dirs.: W. G. Pascall, The Winds, Smitham Bottom Lane, Purley; F. L. Goldby, Chequers, London Road, Staines, Middlesex.

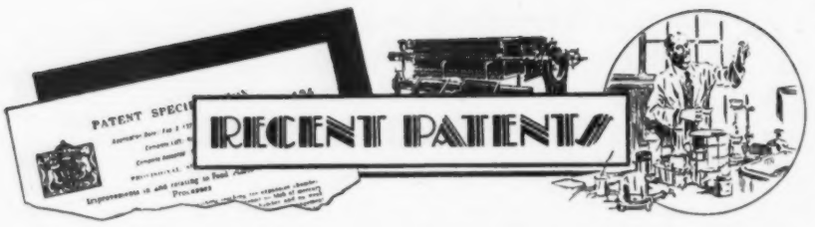
Plantation and Colonial Products, Street, E.C. 3. To carry on the bus. of dlrs. in cocoa and other produce, etc. Nom. Cap.: £100,000 in £1 shares. Dirs.: To be appointed by the subs. Qual. of dirs.: As voted by the company.

Robin Food Products, Limited. (328,541.) 17, Hanover Square, W. 1. To carry on the bus. of mnfrs. of an dlrs. in foods and foodstuffs, etc. Nom. Cap.: £100. Dir.: C. L. Rubens, 170, Pullman Court, Streatham Hill, S.W. 2.

Tenterden Trading Company, Limited. (328,273.) To carry on the bus. of growers of and dlrs. in fruit and vegetables, etc. Nom. Cap.: £2,000. Permt. dir. and ch.: W. E. Judge, Burren, Ashford Road Tenterden.

Windles (Waterfoot), Limited. (327,331.) Mount Spring Works, Waterfoot, Rossendale. To carry on the bus. of mnfrs. of aerated waters, mineral waters, cordials, etc. Nom. Cap.: £2,000 in £1 shares. Dirs.: D. G. Windle, Hollin House, Scoutbottom, Waterfoot, Rossendale; D. Windle, Nordale, 386, New Church Road, Rawtenstall; B. Croisdale, 489, Burnley Road, Waterfoot, Rossendale.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

15586. DUBBERS, H.: Preparation of crustless cheese. June 4.
15669. MCCROSSON, J. T.: Method of processing coffee.
15711. MARTIN, D. R.: Treatment of flour, etc. June 7.
15781. LAMBINON, G.: Manufacture of crystallised sugar. June 7.
16042. SOC. D'ÉTUDES ET APPLICATIONS INDUSTRIELLES: Manufacture of soluble dry products containing a concentrated coffee extract. June 9. (Switzerland, February 18.)
16253. COOPER, C. E. T.: Apparatus for grading fruit, etc. June 11.
16326. MOSTNY, H.: Manufacture of fruit vinegar. June 11. (Austria, June 20, 1936.)
16692. BROWN, C. STUART-, BROWN, G. STUART-, BROWN, H. J. STUART-: Wrapper for butter, etc. June 16.
16766. DANTZIG, A. VAN: Production of ice-cream preparations, etc. June 16. (Holland, May 8.)
16826. JUNG, F.: Production of storable milk products. June 17.
17025. MAAS, L. J. P.: Treatment of dough. June 18.
17125. ADAMS, F.: Means for wrapping butter, etc. June 19.
17463. FAUTH PATENT AKT.-GES.: Comminution, etc., of oil seeds. June 23.
17521. DEUTSCHE MAIZENA GES.: Production of starch from potatoes, etc. June 23.
17636. HALL, D. H.: Treatment of citrus fruit products. June 24.
18092. KNOLLENBERG, R.: Drum-driers for milk, etc. June 29.
18121. BRISK, L.: Preparation of worts for the manufacture of yeast. June 30.

Complete Specifications Accepted

466,517. BURGESS, A. F. (KRAFT-PHENIX CHEESE CORPORATION): Method of the treatment of cheese.
466,882. STANDARD BRANDS, INC.: Treating seeds, beans, and the like.
466,963. MCKINNON AND CO., LTD., W., and CARNIE, J.: Machines for extruding premier jus, suet, fat, and like stuff.
467,370. SPALDING, C. G., and GOULD, G. R.: Production of pectin composition.
467,618. TAKAMIYA, E.: Process of preparing oil and fat splitting enzyme from plant seeds.
467,678. NOWAK, B.: Method of making cheese from milk.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 25s. each.

462,897. **Bread.** LYONS AND CO., LTD., J., and COHEN, V. L. (Divided out of 462,389.)
Stale bakery products—*e.g.*, rolls of bread—are restored to a fresh condition by subjecting the goods to the action of freely circulating heated air at an even controlled critical temperature. Different classes of bakery products may require different treatment temperatures, but the critical temperature will be of the order of 250° to 300° F. A suitable oven in which to treat the products is described in Specification 462,389. The goods are preferably supported so that their whole surface is exposed to the air stream—*e.g.*, on wire trays or shelves.

LATEST TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

ARABIAN NIGHTS. — 577,245. **Coffee.** PERCY FRANK CHAPLIN, 42 to 46, Minories, London, E.C. 3. July 7.

BILTMORE.—577,594. **Biscuit rusk and bread rusk for use as a sausage binder.** HERBERT AND SONS, LTD., 6 and 7, West Smithfield, London, E.C. 1. July 7.

BON MATIN.—577,180. **Canned fruits.** J. AND J. LONSDALE AND CO. (LONDON), LTD., Fennings Wharf, London Bridge, London. June 16.

CALCILAC. — 572,202. **Powdered milk products (for food) containing a calcium compound.** COW AND GATE, LTD., Cow and Gate House, Stoke Road, Guildford, Surrey. July 7.

DANNY BOY.—577,170. **Substances used as food or as ingredients in food.** THOMAS MCCONNELL, Botolph House, 10, Eastcheap, London, E.C. 3. June 23.

FLEPZ.—576,168. **Beverages (not alcoholic, not aerated and not medicated).** HORTICULTURAL CHEMICALS, LTD., 6, Spout Yard, Louth, Lincolnshire. June 30.

HOWDOVITE.—576,815. **Beverages (not alcoholic, not aerated and not medicated).** STANLEY GEORGE HOWDEN SIMPSON, trading as The Howden Research Laboratories, Howden Lodge, Hangleton Road, Hove, Sussex. July 7.

Registration of this trade mark shall give no right to the exclusive use of the fruit devices.

KILVERTS' "CURLY TAIL" LARD.—

573,876. **Lard for food, produced in England.** N. KILVERT AND SONS, LTD., Trafford Park Road, Trafford Park, Manchester, 17. (Associated.) June 23.

Registration of this trade mark shall give no right to the exclusive use of the word "Kilverts".

KROOPOOK.—577,214. **Substances used as food or as ingredients in food.** GREGOR MESROPE GREGORY, 37, Mark Lane, London, E.C. 3. June 16.

MACFARLANE LANG.—567,900. **Biscuits.** MACFARLANE, LANG AND CO., LTD., Victoria Biscuit Works, Clydeford Drive, Tollcross, Glasgow. (Associated.) July 7.

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the devices of eggs, biscuits and ears of corn.